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Quality Assurance Project Plan

S. H. Bell Company

Chicago, Illinois

Revision 0

(March 24, 2017)

Prepared for:

S.H. Bell Company
10218 South Avenue O
Chicago, Illinois 60617

Prepared by:

Consolidated Analytical Systems, Inc.
201 S. Miami Avenue
Cleves, OH 45002

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Approved by:

CAS Project Manager	*Date*
S.H. Bell Company Representative	*Date*
USEPA Region 5 Representative	*Date*
CAS Quality Assurance Project Officer	*Date*

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A. PROJECT MANAGEMENT

This Quality Assurance Project Plan (QAPP) documents the policies and procedures to be implemented at the S.H. Bell Company facility in Chicago, Illinois to meet the United States Environmental Protection Agency (USEPA) guidelines for conducting environmental monitoring programs. This QAPP has been prepared in accordance with the guidance outlined in USEPA's "*EPA Guidance for Quality Assurance Project Plans*", (USEPA, 2002) and " *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations*," (USEPA, 2001). The purpose of this document is to describe the sampling and analytical methods that will be used to gather the monitoring data, and the procedures employed to assess, control , and document the data quality.

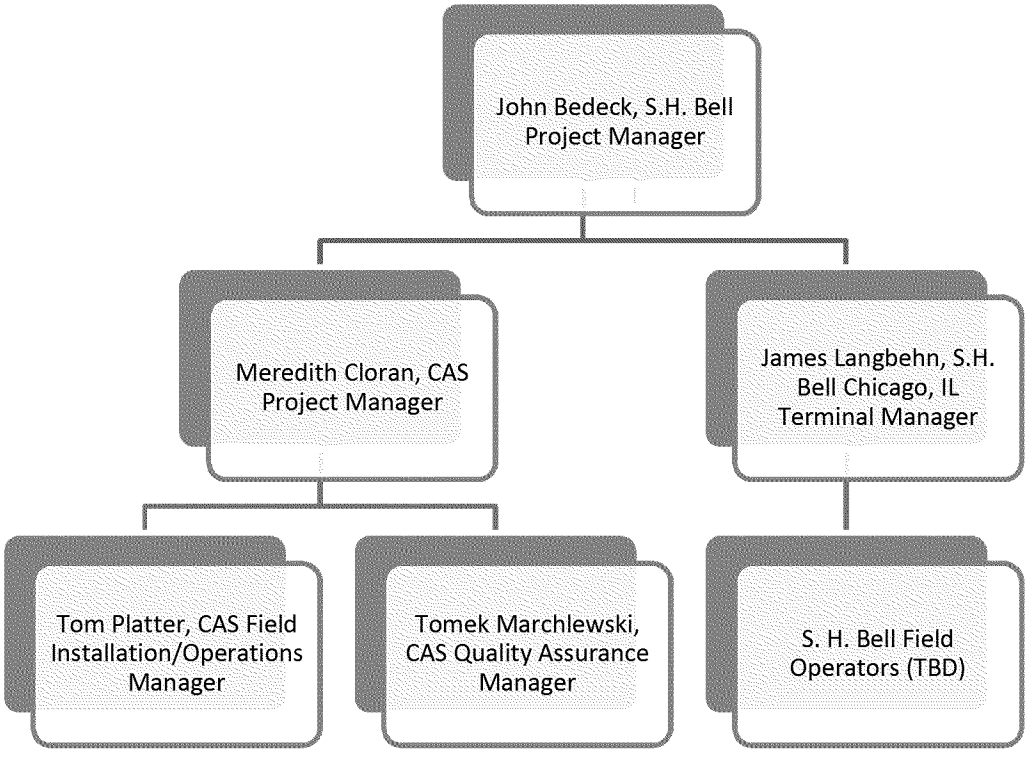
Following this format, this QAPP is divided into five sections with the following contents:

- **Section A – Project Management –** Provides a description of the project organization, administrative functions, and goals, as well as an overview of the project approach.
- **Section B – Measurement and Data Acquisition –** Provides a detailed description of all the elements of the monitoring strategy and methods, including the methods for sampling, sample handling, analytical methods, quality control, instrument calibration, and data management;
- **Section C – Assessment and Oversight** – Provides a description of the procedures that will be used to assess and report on the QA/QC elements employed in the project;
- **Section D – Data Validation and Usability** – Provides a description of the methods that will be used for data review, verification, and validation; and
- **Section E – References –** Provides references to applicable regulatory and method specific documents that form the basis for obtaining the measurement data.

A1 Project/Task Organization

The organizational structure for the air monitoring program at the S.H. Bell facility in Chicago, Illinois and a description of the responsibilities of those within it are described in this section. Figure A-1 shows key personnel and team roles, including the S. H. Bell Project Manager, the CAS Project Manager, the S.H. Bell Field Installation/Operation s Manager, and the CAS Quality Assurance Officer. Key individuals and their responsibilities are identified below:

Figure A-1. Project Organizational Chart



S.H. Bell Project Manager – The principal contact person for S.H. Bell Company is Mr. John Bedeck (or his designee). Mr. Bedeck's responsibilities include the following:

- Provide direct oversight of the S.H. Bell monitoring project
- Serve as USEPA's communication contact for all activities at the S.H. Bell Chicago, Illinois facility
- Any changes to the scope of the monitoring program will be made only with the written approval of the S.H. Bell Project Manager and review by EPA Region 5
- Review and submit monthly monitoring reports to USEPA

S.H. Bell Chicago, Illinois Terminal Manager – The S.H. Bell Chicago, Illinois Terminal Manager is Mr. James Langbehn (or his designee). Mr. Langbehn's responsibilities include the following:

- Provide oversight of monitoring activities conducted at the S.H Bell Chicago, Illinois facility
- Coordinate on-site record keeping, including site visits, operator activities, and monitoring system conditions and corrective actions

- Report exceedences and corrective actions to USEPA Region 5
- Maintain records of S.H. Bell operations (such as dates and duration of material unloading and processing)
- Notify USEPA of any barge unloading operations of direct reduced iron
- Record observations of possible interferences at nearby facilities

CAS Project Manager – Ms. Meredith Cloran is the CAS Project Manager. Ms. Cloran's responsibilities include the following:

- Communicate with S.H. Bell to ensure the full implementation of the QAPP and notification of general corrective actions
- Oversee day to-day project activities, including ensuring the proper execution of the monitoring work and tracking the project budget.
- Provide the primary leadership of the CAS project team membersand coordination with the contract laboratory.
- Ensure QAPP objectives are met in accordance with USEPA requirements
- Develop and ensure QA/QC procedures and Standard Operating Proœdures are followed
- Report non-confirming conditions to S.H. Bell and follow up corrective actions taken using appropriate documentation procedures.
- Prepare monthly reports for S.H. Bell's review and submittal to USEPA

CAS Field Installation/Operations Manager – Mr. Tom Platter is the CAS Field Installation and Operations Manager. He is responsible for the following items:

- Integrate and install the monitoring equipment
- Perform site set-up and calibration
- Oversee performance of monthly maintenance visits and quarterlyaudits
- Train field staff to collect field parameters and samples (including filters for laboratory analysis)
- Assemble data records from field technicians and ensure the collection of valid measurement data.
- Assemble data records from field technicians

- Report non-confirming conditions to CAS Project Manager and follow up corrective actions taken using appropriate documentation procedures.

CAS Quality Assurance Manager – Mr. Tomek Marchlewski is the CAS Project QA Manager. He is responsible for the following tasks:

- Oversee remote monitoring
- Perform data validation activities as needed
- Verify required QC activities are performed and that measurement quality objectives are met as prescribed in this QAPP
- Verify data and flags from continuous monitors
- Review laboratory analytical data packages
- Prepare report information in appropriate format
- Report non-confirming conditions to CAS Project Manager and follow up corrective actions taken using appropriate documentation procedures.

S.H. Bell Field Operators – Several S.H. Bell employees provide operations support tasks as described below (each have been trained by the CAS Field Installation/Operation Manager and their activities are overseen by the S.H. Bell Terminal Manager:

- Collect manual samples
- Record relevant field data

A2 Problem Definition and Background

S.H. Bell has been asked to provide information to the United States Environmental Protection Agency (USEPA) under Section 114 of the Clean Air Act (CAA), 42 U.S.C. Section 7414(a) (USEPA, 2015), herein referred to as the Request for Information (RFI). To meet this request, S.H. Bell has submitted, and USEPA Region 5 Air and Radiation Division has approved proposed monitoring site locations for Federal Equivalent Method (FEM) real-time PM10 monitoring and Federal Reference Method (FRM) PM10 filter-based monitoring as well as wind speed and direction monitoring. Per the requirements of the RFI, S.H. Bell will conduct PM10 and meteorological monitoring for a period of one year from the date of installation (noted to be: February 28, 2017) and will submit reports of monthly data to USEPA (S.H. Bell Company, 2016-2017 "Siting Plan"). A copy of the Siting Plan is attached to this QAPP for reference as Appendix D.

In addition, the RFI requires a 10-meter meteorological station be operated at the S.H. Bell facility to measure and record wind speed and direction through the area during the one-year study period. The meteorological station is located near the center of the S.H. Bell Chicago

facility as shown on Figure B-1. The meteorological monitors meet the specifications of USEPA's Quality Assurance Handbook for Air Pollution Measurement Systems Volume IV: Meteorological Measurements Version 2.0 (Final) (USEPA, 2008). The meteorological station is equipped to record the following meteorological parameters:

- Wind Speed
- Wind Direction
- Ambient Temperature
- Barometric Pressure

A3 Project/Task Description and Schedule

This project is conducted to provide air quality and meteorological data from four monitoring sites located around the S.H. Bell Chicago, Illinois facility.

The monitoring stations incorporate continuous Federal Equivalent Method (FEM) real-time PM10 monitors, data loggers, and Federal Reference Method (FRM) PM10 filter-based monitors as outlined in the Siting Plan (S.H. Bell, 2016-2017) – included as Appendix D of this document. Continuous (FEM) monitors are operated to obtain hourly continuous average data. Filter-based FRM monitors are operated to follow the USEPA's 3-day Monitoring Schedule for 2017 (included as Appendix C). PM10 filters collected from the FRM filter-based monitors undergo both gravimetric analysis and determination of lead and toxic metals (arsenic, cadmium, chromium, manganese, nickel, and vanadium) at an off-site laboratory in accordance with FRM/FEM laboratory methods (see Section B for additional detail on laboratory analysis). The meteorological conditions are also continuously measured and are stored in an onsite data logger as five-minute averages. Please note that as of the date of this QAPP, meteorological equipment is operating separately from the PM10 sampling network, until such time as it can be integrated into the monitoring network. S.H. Bell will amend the QAPP following integration of the meteorological data into the CAS-operated data acquisition system. Meteorological equipment (wind speed and wind direction equipment and data logger) was initially installed at the S.H. Bell facility in 2014. The system was updated in December 2016 to include temperature and barometric pressure sensors integrated with the meteorological data logger.

The commissioning of the particulate monitoring stations took place February 27-28, 2017. The first filter-based FRM sample was collected March 2, 2017, and additional samples are to be collected in accordance with USEPA's 3-day Monitoring Schedule (See Appendix C). Deliverables for the project include the following items:

1. This QAPP;
2. Hourly data from each continuous monitor and the meteorological monitoring site (in ASCII comma-delimited files) and laboratory data from filter-based sample analysis (in laboratory reporting format) provided to EPA on CD every month; and
3. Monthly data submittal of items detailed in Item 2 above to be sent to EPA by email within 14 days of the end of the month being reported for a period of one year. Please see Section B7 for additional detail.

A4 Data Quality Objectives and Criteria for Measurement Data

The EPA has developed a Data Quality Objective (DQO) process for use in the planning of environmental measurement projects. The DQO process has been used in the preparation of this QAPP and in the planning for this project. The results of the 7-step DQO process are shown in Figure A-2. The benefits of the DQO process are that it prompts a statement of the problem or issue, identifies the decision(s) to be made and the inputs needed to make the decision(s), and specifies a decision rule.

Following the DQO process, a set of quality criteria is defined for the measurement data. For this project, those criteria are given in Table A-1. These criteria are designed to provide accurate measurements of PM10 and determination of lead and toxic metals (arsenic, cadmium, chromium, manganese, nickel, and vanadium). The criteria for meteorological data measurements are patterned after the onsite regulatory meteorological monitoring guidance published by EPA (USEPA, 2008).

A5 Documentation and Records

The dataset created for this monitoring program will consist of these components stored for a minimum of five years in the project database:

- The hourly PM10 data from each of the four monitoring sites (from FRM continuous monitors);
- The laboratory analyses of manual samples (from FEM filter-based monitors) for PM10 gravimetric mass and select metals; and
- The 5-minute average wind speed, wind direction, ambient temperature, and barometric pressure at the meteorological monitoring site.

The following sources of information will support these data:

- Station log books (in hard copy and electronic format);
- Calibration and maintenance records for all measurement systems;

- Laboratory reports with quality control results;
- Operational information collected internally by each monitor or sampler;
- Data validation and editing instructions; and
- QA audits of field operations and monitor performance.

Table A-1. DQO Process for S.H. Bell Company Chicago, IL Project

STEP 1	State the Problem	S. H. Bell has agreed to establish a program to conduct both FEM real-time PM10 monitoring at four monitoring locations and FRM PM10 filter-based monitoring at one monitoring location to determine on-site or off-site (whether upwind and/or downwind) contributions, if any, to the monitors. Additional manual sampling is needed to provide speciation data for metals and PM10.
STEP 2	Identify the Decision	An ambient air monitoring program conducted at the areas identified by predominant wind flow and potential for community impact. The speciation data will be used to assist in possible determination of PM10 sources.
STEP 3	Identify the Inputs to the Decision	Measurements of PM10 concentrations will be made at four (4) locations as 1-hour averages. Meteorological data (wind speed, wind direction, ambient temperature, barometric pressure) will be collected on a 5-minute basis at the existing meteorological station located in the central portion of the S.H. Bell facility. Speciation samples will be obtained from two instruments located at monitoring station S4 (See Figure B-2).
STEP 4	Define the Study	The sampling locations and frequency of sampling are defined in Section B of the QAPP document.
STEP 5	Develop a Decision Rule	S.H. Bell will use the reported concentration levels and meteorological data to help assess net facility impacts and upwind background.
STEP 6	Specify the Limits of Decision Error	Calibration of the monitoring equipment will be conducted as specified in EPA guidance documents and quality control limits will conform to guidance. See Tables A-1 and A-2.
STEP 7	Optimize the Design	If the current system does not conform to the required QA/QC protocols, S.H. Bell will initiate corrective action to bring the program into conformance.

Table A-2. Quality Criteria for Measurement Data

1. Measurements of PM_{10} using EPA Federal Equivalent Method (FEM) Monitor (BAM-1020, EQPM-0798-122	
Sensitivity	Lower Detection Limit <4.8 µg/m^3 2σ, 1-hour average
Accuracy	Meets EPA Class III FEM Standard for additive and multiplicative bias; flow rate measurement accuracy ±4% at 16.7 LPM
Range	1 – 1000 µg/m^3
Completeness	75% sample capture rate or better quarterly for each monitor at each site (with the exception of Acts of God, loss of power, scheduled calibration/audit events, or other situations over which neither S.H. Bell nor their monitoring contractor have control)
Cycle Time	One hour
2. Measurements of Metals using EPA Method IO-3.5 (ICP-MS)	
Accuracy	±20% for analytical results above the reporting limit
Precision	±10% for analytical pairs above the reporting limit
Completeness	80% or better quarterly for each sampler (with the exception of Acts of God, loss of power, or other situations over which neither S.H. Bell nor their monitoring contractor have control)
3. Measurements of PM_{10} using EPA Federal Reference Method (FRM) Sampler (Tisch Environmental TE-6070 DV-BL, Federal Reference Number RFPS-0202-141)	
Accuracy	Flow rate measurement accuracy ±7% of the calculated Qa [Orifice] (USEPA, 1999a)
Precision	N/A
Completeness	75% sample capture rate or better quarterly for each sampler (with the exception of Acts of God, loss of power, or other situations over which neither S.H. Bell nor their monitoring contractor have control)
3. Measurements of Meteorological Parameters using weather instruments (Climatronics/MetOne Wind Speed, Wind Direction, Temperature, Barometric Pressure)	
System Accuracy	TBD*
Precision	EPA methodology does not provide for assessment of measurement precision
Completeness	90% or better quarterly for meteorological data based on hourly averages with a minimum 75% completeness of 5-minute data to construct a valid hourly average (with the exception of Acts of God, loss of power, scheduled calibration/audit events, or other situations over which neither S.H. Bell nor their monitoring contractor have control)*

*As of the date of this QAPP, meteorological equipment is operating separately from the PM10 sampling network, until such time as it can be integrated into the monitoring network. S.H. Bell will append the QAPP following integration of the meteorological data into the CAS-operated data acquisition system.

B. MEASUREMENT DATA ACQUISITION

B1 Sampling Process Design

S.H. Bell will establish four monitoring sites at its Chicago, Illinois facility in accordance with the requirements detailed in USEPA's Section 114(a) request. Details of the source area, sampling methods, sample handling, analytical methods, Quality Control (QC), instrument testing and calibration and data management are described in the following sections.

B1.1 Source Environment Description

S.H. Bell's Chicago, Illinois facility is located in south Chicago, approximately 13 miles south of the city center, in the community of East Side between Lake Michigan and the Calumet River. The S.H. Bell facility is located approximately ½ mile west of Lake Michigan and is bordered to the west by the Calumet River. The elevation of the area is approximately 590' above sea level, and terrain is relatively flat.

The local land use categories include refining and heavy industry in the corridor along the Calumet River. Surrounding areas to the east and south are primarily residential. Minor river ports and canals are present in the area and provide access to Lake Michigan.

The climate of the area where the Terminals are located is characterized by cold winters and warm summers with occasional heat waves. The average temperature in January is 22º F and the average temperature in July is 73.3º F, although 90º summer days are not uncommon.

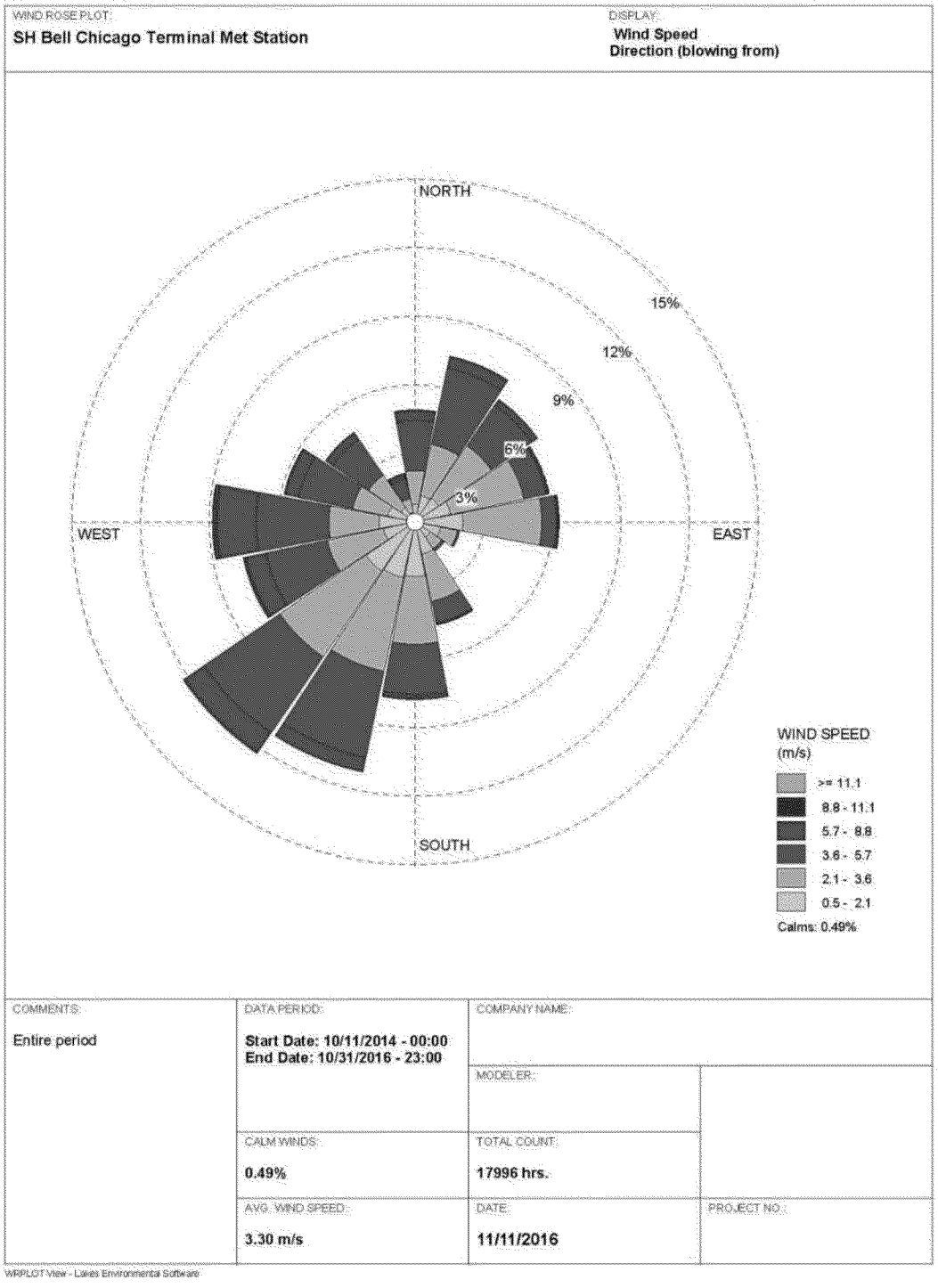
The annual average snowfall in winter is 37.5" and the annual average precipitation total is about the same. The proximity of S.H. Bell to Lake Michigan's southernmost tip brings wind effects year-round. Annual wind roses for the S.H. Bell facility indicate a strong NW component. In general, the predominant wind direction in the vicinity of the site is from southwest to northeast. (See Figure B-2).

B1.2 Monitor Site Description

Figure B-2 shows the locations of the monitoring stations S.H. Bell will operate as part of this program. The yellow outline indicates the approximate property boundaries. An example historical wind rose plot from the S.H. Bell facility is shown in Figure B-2. Table B-1 lists the monitoring network configuration by site.

Figure B-1: Monitoring Site Locations for the S.H. Bell Chicago Facility

Figure B-2: Historical Wind Rose Data (October 2014 thru October 2016) for S.H. Bell Chicago Facility



B2 Sampling Methods Requirements

Sample collection methods are presented in this section as are sample documentation and control requirements that are applicable to the network. Threetypes of sampling methods have been identified for the S.H. Bell monitoring network. Hard copies of equipment manuals are kept on-site at the S.H. Bell facility inside each equipment shelter at S1, S2, S3, and S4. Electronic copies of the manuals are also stored on the CAS project server maintained at CAS's Cleves, Ohio facility.

Table B-1. S.H. Bell Monitoring Network Configuration by Site

Monitoring Site ID	Approximate Location		Monitoring Equipment
	Northing	Easting	
S1	41.708239	-87.544058	BAM-1020 monitor for PM10 (Continuous FEM)
S2	41.710553	-87.539204	BAM-1020 monitor for PM10 (Continuous FEM)
S3	41.710552	-87.542043	BAM-1020 monitor for PM10 (Continuous FEM) Agilaire 8872 Datalogger
S4	41.711541	-87.539607	BAM-1020 monitor for PM10 (Continuous FEM) Two (2) Tisch Environmental HiVol 6070 DV-BL Filter-Based FRM PM10Monitors
EMS (Existing Monitoring Station)	41.709841	-87.540376	Meteorological monitors (Climatronics: Wind Speed, Wind Direction, Temperature, Barometric Pressure, Data Logger)

B2.1 Sample Collection Methods

BAM-1020 FEM PM_{10}

The PM10 continuous monitors collect ambient particulate matter samples through a size-selective inlet that is designed to allow only particles with an aerodynamic diameter <10 µm to pass through to the measurement apparatus. PM10 is measured using the MetOne Instruments Model BAM-1020 (EPA designated Class III Federal Equivalent Method EQPM-0798-122).

At the beginning of each sample hour, a small 14C (carbon-14) beta-ray emits a constant source of high-energy electrons (known as beta rays) through a spot of clean filter tape. These beta rays are detected and counted by a sensitive scintillation detector to determine a zero reading. The BAM-1020 then advances this spot of tape to the sample nozzle, where a vacuum pump pulls a measured and controlled amount of outside air through the filter tape, loading it with ambient dust. At the end of the sample hour, this dust spot is placed back between the beta source and the detector, thereby causing attenuation of the beta ray signal which is used to determine the mass of the particulate matter on the filter tape.

This mass is used to calculate the volumetric concentration of particulate matter in ambient air.

Specifications for the BAM-1020 are provided in Table B-2. The operation, calibration, and maintenance requirements of the BAM unit are outlined in the MetOne BAM-1020 manual "BAM 1020 Particulate Monitor Operations Manual, BAM-1020-9800, Rev H" (MetOne 2008). A hard copy of the BAM-1020 manual is kept in each of the four monitoring station buildings at S.H. Bell monitoring sites where they operate (S1, S2, S3, and S4). In addition, an electronic copy of the manual is available to all project team members in the Tech Info folder of the S.H. Bell client folder on the CAS Cleves server. The sample inlet height is approximately 3 meters, within the 2-7 meter inlet height specification.

Table B-2. BAM-1020 Specification

Parameter	Specification
Range	1 – 1000 µg/m3
Sensitivity Std Deviation (σ; 1 hr)	<2.4 µg/m3
Flow Rate	16.7 liters/ minute (LPM)
Beta Source	Carbon-14; 60µCi ±15 µCi
Operating Temperature*	0º to 50ºC
Humidity Control	Active control inlet heater; 35% RH setpoint
Analog Output	0-1 VDC std; selectable voltage and current ranges
Memory	182 days @ 1 record/hour

*Operating temperature inside the equipment shelter

Tisch Environmental HiVol 6070 DV-BL Filter-Based FRM PM10

The Tisch Environmental Hi-Vol PM10 FRM samplers collect ambient particulate matter samples through a size-selective inlet that is designed to allow only particles with an aerodynamic diameter <10 µm to pass through to the measurement apparatus. PM10 is measured using the Tisch Environmental Model 6070 DV-BL sequential sampler (EPA designated Federal Reference Method RFPS-0202-141). Specifications for the Model 6070 DV-BL are provided in Table B-3. The operation, calibration, and maintenance of the unit is in accordance with the August 10, 2010 revision of the Tisch Environmental, Inc Operations Manual for 6000-Series PM10 High Volume Air Samplers (Tisch, 2010). A hard copy of the Tisch Environmental Manual is kept in the monitoring station buildings at S.H. Bell monitoring site S4. In addition, an electronic copy of the manual is available to all project team members in the Tech Info folder of the S.H. Bell client folder on the CAS Cleves server. The sample inlet height will be approximately 60 inches from the platform.

Table B-3. Tisch Environmental 6070 DV-BL Specification

Parameter	Specification
Particle Size	PM10
Flow Range	40 cubic feet per minute
Filter Size	8" x 10"
Federal Reference Method	RFPS-0202-141
Flow Control	Volumetric
Motor Type	Brushless
Timer	Digital, 11 day

Meteorological Measurements

An existing 10-meter meteorological tower was installed at the S.H. Bell Chicago facility in 2014. The tower is equipped with wind speed, wind direction, temperature and barometric pressure monitors. The tower continuously measures and records wind speed and wind direction at one-hour intervals. S.H. Bell is able to correlate 1-hour and 24-hour ambient PM10 measurements with wind speed and wind direction data to determine source direction and the effects of wind speed on PM10 concentrations. The meteorological tower also includes calibrated ambient temperature and pressure instrumentation to determine corrected (actual) PM10 concentrations as recorded by the monitors. As of the date of this QAPP, the meteorological equipment is operating separately from the PM10 sampling network, until such time as it can be integrated into the monitoring network. The meteorological monitoring tower remote data collection, archiving, and monthly reporting will be performed monthly S.H. Bell. S.H. Bell will append this QAPP with additional detail regarding the meteorological equipment once it has been integrated into the PM10 sampling network. Table B-4 lists specifications for meteorological sensors.

Each meteorological monitor is wired into a Climatronics data logger with a network interface module at the meteorological tower. The data logger program for the meteorological equipment is LoggerNet. Meteorological monitoring tower remote data collection, archiving, and reporting will be performed monthly by S.H. Bell. Data will be archived and edited as necessary. Reports with hourly average meteorological data including wind speed, and wind direction will be provided to US EPA by S.H. Bell monthly. Semi-annual calibrations of the meteorological monitoring system will be performed by Murray and Trettel, Inc. NIST-traceable test equipment will be used during calibration. Wind speed sensors will be swapped and bearings replaced every 6 months. Wind direction sensors will be swapped and bearings replaced every 12 months. Completed calibration logs will be provided to S.H. Bell.

Table B-4. Meteorological System Components

Components	Climatronics/MetOne* Part Number)
Wind Speed Sensor (2)	100075S
Wind Direction (2)	100076S
Platinum Temperature Probe	T-200A*
Six Plate Radiation Shield	5980*
Barometric Pressure Sensor	102663-2*
Crossarm	101994-1
External Heaters	101235-G1
Heater AC Cable	101255-40
Wind Cable	100605-40
Data Logger in Enclosure	102700-G1
Battery Back-Up Power Supply	101139
AC Surge Protector	415
Signal Line Surge Protector	101904
Network Link Interface	CNL201
Windows Data Logger Software	LOGGERNET
Tower Kit – 34'	970895
Full Height Grounding Kit	100924

*Denotes MetOne part number. All others are Climatronics part numbers

Additional measurements of ambient temperature and barometric pressure will be collected from each BAM-1020 unit using onboard sensors, which enable them to calculate the correct flow rates for PM10 monitoring. Sensors will be sited according to EPA guidelines.

Shelters

Temperature controlled shelters (CAS 9004 series) with an equivalent insulation value of R-25 will be installed at each of the four monitoring sites (S1, S2, S3, and S4). Each shelter is equipped with a commercial-grade climate control system. All internal wiring meets or exceeds National Electrical Code (NEC). Each shelter is equipped with a sample inlet flange through which the BAM-1020 inlet tubing is routed. Roof flange also accommodates the BAM-1020 temperature/pressure data signal cable.

Data Systems and Software

The BAM-1020 units have onboard data logging capability of up to six months, so data values and diagnostic information are readily accessible. Agilaire's AirVision software is used to communicate with the BAM-1020s.

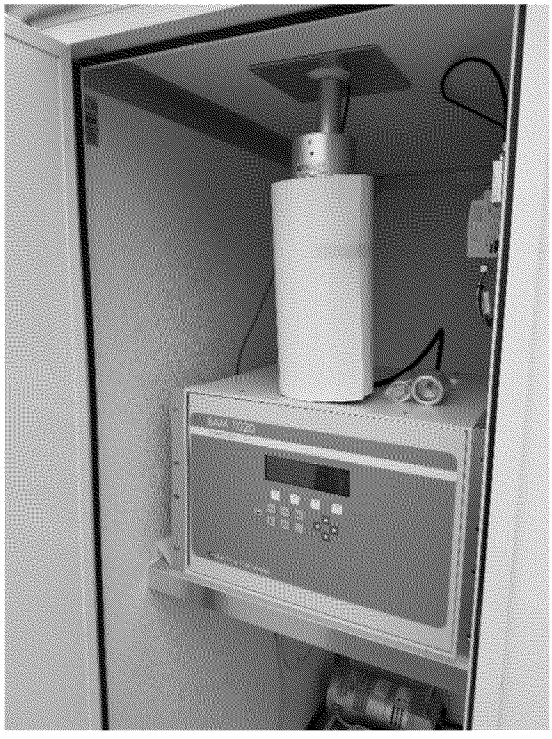
An Agailaire Model 8872 data logger is located at monitoring site S3. It is connected to the other three monitoring sites (S1, S2, and S4) with the use of radio modems to receive data from the BAM-1020 FEM monitors. The radio modem at S3 is a base unit that receives communication from the other remote radio modems at S1, S2, and S4. Data from the

Agilaire 8872 data logger is transmitted via cellular modem to AirVision (the Agilaire data reporting and validation package), which is hosted on the CAS server in Cleves, Ohio. Figure B-3 provides an overview of shelter configurations at the four monitoring sites

Each meteorological monitor is wired into a Climatronics data logger with a network interface module at the meteorological tower. The data logger program for the meteorological equipment is LoggerNet.

Figure B-3. Overview of Shelter Configurations

S1 (Monitoring Site 1)



S2 (Monitoring Site 2)

S3 (Monitoring Site 3)

S4 (Monitoring Site 4)

All datalogger, monitor, and sampler time settings will be set within ±60 seconds of the site technician's reference time obtained from a local cell phone network and checked at least once every 30 days. Instrument clocks that are more and 60 seconds from the reference clock shall be reset to within 60 seconds of the reference clock. Records of resets will be recorded in the appropriate site logbooks housed at each of the monitoring sites.

B2.2 Sample Documentation and Control Requirements

Field operation records include site visit and maintenance logs, checklists, chain of custody forms, continuous monitor calibration documents, high-volume sampler calibration and flow verification records, and meteorological calibration documents. All of these records are in electronic form, as spreadsheets or text files. All field operation records are returned at least monthly to the CAS project manager for inclusion in project files. The automatic data polling systems for the continuous monitoring network is password protected and only CAS team members have access. Sample checklists and calibration documents are presented in Appendix A and an example chain of custody form for laboratory samples is presented in Appendix B. The chain of custody protocol will follow the general guidance of Section 8 of Volume II of the EPA QA Handbook and sample specific requirements for storage and handling in each applicable analytical method.

B3 Analytical Methods Requirements

The monitoring program will collect 24-hour PM10 filter samples from the Tisch Environmental High Volume Filter-Based FRM PM10 monitors that will undergo both gravimetric analysis and determination of lead and toxic metals. To optimize the sampling schedule, CAS will operate two Tisch Environmental Model 6070 D V-BL PM10 samplers at monitoring site S4. These samplers will operate from midnight to midnight, every three days, according to USEPA's 3-day sampling schedule. The 2017 USEPA's 3-day sampling schedule is included as Appendix C. The first sample date is set for March 2, 2017. Particulate matter is collected on numbered, pre-weighted 8" x 10" filters supplied by Intermountain Laboratories in Sheridan, Wyoming. Samples will be collected approximately weekly, after every 1-3 sample events as determined by the sampling schedule and S.H. Bell's operating hours and returned to the Intermountain Laboratories in Sheridan, Wyoming for gravimetric analysis and determination of lead and toxic metals.

Intermountain Laboratories will initially perform a gravimetric analysis of the filters to determine PM10 mass concentration using USEPA Compendium Method IO-2.1 (USEPA, 1999a). The mass concentrations produced should provide a general indication of measurement agreement with the BAM-1020 continuous monitors at each of the S.H. Bell Chicago facility's four monitoring sites.

Following gravimetric analysis, for the determination of lead and toxic metals (arsenic, cadmium, chromium, manganese, nickel, and vanadium), filters are extracted using microwave or hot acid, then analyzed by inductively coupled plasma/mass spectrometry (ICP/MS). Intermountain Laboratories performs the extraction procedure in accordance with USEPA's Inorganic Compendium Method IO-3.1 (USEPA, 1999b). Intermountain Laboratories performs the determination of metals by ICP/MS in accordance with USEPA's Inorganic Compendium Method IO-3.5 (USEPA, 1999c). The estimated Method Detection Limit (MDL) for each of the target metals is listed in Table B-5.

Table B-5. Estimated Method Detection Limits for Target Metals

Metal	Method Detection Limit (in ng/m³)
Arsenic	0.52
Cadmium	0.10
Chromium	0.26
Lead	0.10
Manganese	0.26
Nickel	0.52
Vanadium	0.52

*ng/m3 – nanograms per cubic meter

Laboratory records include sample cassette IDs imprinted upon the filter screens, chain-of-custody forms matching cassette ID to sample ID, raw data files from the analysis, QC check data, analysis reports, and electronic data transmittal to the project database. The laboratory is responsible for maintaining and long-term archival of records is accomplished using a well-defined laboratory procedure. Each time that the lab receives field samples, sample login e-mail verification is sent to the data management task leader, as a scanned Adobe Acrobat file of the chain-of custody form.

An important consideration of the analytical work is the treatment of data at low concentrations near the method detection limit for the laboratory. Each laboratory has two boundaries within its S.H. Bell reporting protocol: the Method Detection Limit (MDL) and the Reporting Limit (RL). Each target compound on the S.H. Bell list has a unique MDL and RL. The RL is typically five times higher than the MDL, and results reported within this concentration range between MDL and RL are flagged as such. The precision and accuracy specifications are applicable to measurement data at or above the RL, and lower concentration data are possibly outside the quality specifications and should be treated accordingly by data users. The laboratory analysis conditions, such as sample or digestate volume can vary slightly from sample to sample, so these numbers are not absolute.

B4 Quality Control Requirements

The quality control (QC) methods employed in the S.H. Bell Chicago monitoring network are described in this section. Field QC efforts are described in Section B4.1 and lab QC efforts are described in Section B4.2.

B4.1 Field Quality Control

Field quality control encompasses several areas of concern. The tasks required of the field technician to promote quality are as follows (calibration tasks are discussed in Section B5):

Documentation

The operator will maintain a file of site information that will include site visit and maintenance logs, operator checklists and calibration data. A logbook and field forms are kept in the monitoring equipment shelters at each of the Chicago monitoring stations (S1, S2, S3, and S4). Copies of this documentation will be forwarded to the project team at least monthly, and these items will be retained in project files. Submittal via electronic mail is acceptable. Examples of the calibration data sheets and operator checklists are presented in Appendix A.

PM10 Continuous Monitor Checks (BAM-1020)

Monthly leak check, quarterly flow rate check and temperature/pressure transducer checks, and yearly 72-hour zero checks will be performed on the BAM-1020s. In addition, leak checks and flow or temperature/pressure checks will also be performed after any major maintenance, as recommended in the BAM-1020 manual. Additional maintenance checks are listed on the monthly QC spreadsheet used for this project (an example is shown in Appendix A).

High-Volume PM10 Monitor Checks (TE 6070 DV-BL)

Appendix B includes a sample Chain-of-Custody (COC) form and sample Particulate Sampler Field Envelope for the contract laboratory performing gravimetric analysis and determination of lead and toxic metals (Intermountain Laboratories). Five-point multi-point calibrations will be performed on the TE 6070 DV-BLs annually, and single point flow verifications will be performed quarterly. Checks will be recorded on the QC spreadsheet. Additional maintenance checks are listed on the monthly QC spreadsheet used for this project (an example is shown in Appendix A).

Meteorological Equipment Checks

The field technician will visually inspect the meteorological equipment at each visit (approximately weekly) for signs of deterioration or damage. Any damage will be reported to Murray and Trettel, Inc., the meteorological equipment contractor. The meteorological

sensors will be calibrated with NIST-traceable test equipment, which will be provided to S.H. Bell. The field technician will also review recent data and compare it to local weather reports or National Weather Service conditions for the area.

All sensors are initially calibrated and certified by the instrument manufacturer and then compared to a traceable standard under ambient conditions every six months when deployed to the field.

The ambient temperature and barometric pressure sensor outputs will be compared to traceable temperature and pressure standards of known accuracy every six months with the meteorological system calibration. The monthly checks for the temperature and pressure sensors for the BAM is documented on the BAM QC sheet. Since the temperature and pressure readings are critical to subsequent PM10 mass calculations. A summary of service checks is proved in the BAM manual (refer to Section 7 of the manual).

Shelter Checks

The shelter's role in quality control is to provide a temperature-controlled environment in which the monitoring equipment can operate at optimum performance. Monitors and data loggers must be housed in a shelter capable of fulfilling the following requirements:

- The shelter must protect the instrumentation from precipitation and excessive dust and dirt, provide third wire grounding as in modern electrical codes, meet federal Occupational Safety and Health Administration regulations, and be cleaned regularly to prevent a buildup of dust.
- The shelter must protect the instrumentation from any environmental stress such as vibration, corrosive chemicals, intense light, or radiation.

B4.2 Laboratory Quality Control

The following lists present some of the common quality control procedures required by the methods for each type of analysis. Specific quality control measures are provided in the laboratory SOP documents kept on file and available via request at Intermountain Laboratories.

Gravimetric Analyses

Laboratory quality control for gravimetric mass analyses by USEPA Compendium Method IO-3.1 includes the following:

- Use media that meet the requirements for sampling presented in IO Method IO-3.1 Section 4.
- Equilibrate media under the temperature and humidity control requirements of the Method before weighing.

- Use the same microbalance for pre- and post-sampling weighing events.
- Calibrate the microbalance using Class S standard weights.
- After every tenth weighing, re-zero the balance and perform a standard weight check.
- Reweigh 10% of the samples using a different analyst.

Metals Analyses

Laboratory quality control procedures for metals analyses by US EPA Compendium Method IO-3.5 includes the following:

- Use at least two calibration standards, and one calibration blank while performing initial calibration.
- While performing calibration verification checks, use calibration standards from a different vendor.
- Analyze a calibration blank before each run.
- Run interference check standards though the analyzer.
- Use continuing calibration standards to check the response of the instrument, as required, depending on the number of filters in a batch.
- A reagent blank should be tested.
- Laboratory control spikes should be used after each batch of samples.
- Analyze a matrix spike during each run.
- Test a duplicate or spike duplicate after testing a group of samples.

Sample Naming Convention

CAS will be using the following sample naming convention to create unique sample identification (ID) designations for each field sample collected during the S.H. Bell monitoring study. Samples will be identified using the following format:

AABBB-MMDDYY-V

Where:

- **AA** is the collection location; S1 for Site 1, S2 for Site 2, S3 for Site 3, and S4 for Site 4
- **BBB** is the instrument #, HV1 for High-Volume Sampler #1, and HV2 for High-Volume Sampler #2
- **MMDDYY** is the sample month, day, and year
- **V** is the type of sample; R indicates a routine sample and B indicates a trip blank

For example, S4HV1-030817-R represents a regular sample collected on March 8, 2017 at High-Volume Sampler # 1 at Monitoring Site S4.

B4.3 Equipment Testing, Inspection, and Maintenance

Specific tasks for periodic testing, inspection, and maintenance are required for the air sampling and monitoring equipment to provide sufficient quality control to remain within the manufacturer's operating specifications and ensure that the project quality goals are met. Initial system integration testing and verification of each instrument and sampler was performed at the CAS facility in Cleves, Ohio prior to deployment to the field. Additional setup tasks, operational checks and verifications were performed during commissioning of the particulate monitoring stations February 27-28, 2017. The maintenance tasks are summarized for each type of equipment below. These activities must be documented in the site visit logbook kept at each of the S.H. Bell Chicago monitoring sites. The field operations task leader should provide a schedule for all activities and checklists to the field technician. Common consumable parts are maintained in the field technician's possession at the S.H. Bell Chicago facility. Additional parts may be obtained from CAS facility located in Cleves, Ohio. Less common replacement parts and consumables are available for expedited delivery to site via common carrier.

PM10 Continuous Monitor Maintenance (BAM-1020)

Each BAM-1020 PM10 monitor requires periodic maintenance as specified by the manufacturer. Instrument Manuals are provided at each of the SH. Bell Chicago monitoring sites, and detail the required periodic maintenance tasks (Refer to Section 7.1 of the BAM-1020 manual). To assure proper instrument functionality, the maintenance tasks and schedule must be followed and performed at prescribed intervals or in response to an

identified decrease in instrument performance. At minimum, the Continuous PM10 monitor requires the following maintenance:

- nozzle and vane cleaning,
- leak check
- one-point flow system check
- capstan shaft and pinch roller tire cleaning
- PM10 inlet particle trap cleaning
- inspection of filter tape
- checking error logs
- checking real-time clock

High-Volume PM10 Maintenance (TE 6070 DV-BL)

Maintenance of the High Volume PM10 Samplers, TE-6070 DV-BL, is to be performed in accordance with the procedures outlined in in the Operations Manual (Refer to Routing Maintenance Section). Manufacturer prescribed routine maintenance includes the following items (Refer to Sampler Operation Section for procedures and maintenance tasks):

- inspection of all gaskets and seals
- inspection of filter screen and removal of any foreign objects
- inspection of filter media holder
- inspect elapsed time indicator
- clean any excess dirt

Additional quarterly maintenance includes:

- cleaning of the inlet and motor/housing gaskets

Meteorological System Maintenance

The operator must perform an inspection of the tower, mast, and meteorological equipment and perform maintenance activities regularly. The inspection should include verifying the functionality of the wind vane and anemometer and verifying that the temperature/pressure aspirator shield fin set is free from debris. A visual inspection of the signal cables and fastening hardware should be conducted at three-month intervals and during either a system calibration or audit.

B4.4 Acceptance Requirements for Supplies and Consumables

Instrument spare parts, replacement parts and consumables are obtained either directly from the original equipment manufacturer (OEM), authorized distributor, or from a scientific equipment/ materials vendor whose products meet or exceed the OEM specifications or are commonly available (i.e. silicone grease). Contact the CAS Service Department for any parts and/or consumables associated with the PM10 monitoring instrumentation.

B5 Instrument Calibration and Frequency

This section describes the calibration methodology and frequency for each type of measurement conducted in the S.H. Bell PM10 monitoring network.

B5.1 Calibration Requirements for PM10 Continuous Monitors (BAM-1020)

Each BAM-1020 unit deployed to the field carries a factory calibration. Copies of the Certificate of Calibration are included in the 3-ring binders at each of the S.H. Bell Chicago monitoring sites.

During the first quarterly maintenance, the BAM-1020 is subjected to the Background Zero Test (BKGD). The zero-correction check is a 72 hour test utilizing a zero-filter kit installed in place of the PM10 sample inlet heat. Refer to Manual for procedure. Upon completion of the BKGD, a new zero offset value is uploaded to the monitor's firmware. Subsequent BKGD tests are performed during the Annual Service visits or after major repairs but not less frequently than every 12 months.

Annual Three Point Flow System Calibration. A flow calibrator is required to measure the reference flow meter and must include measurements for flow, temperature and pressure in one unit. Each flow calibration process should include an initial leak check, nozzle and vane cleaning, final leak check, three-point flow check (15.0, 18.4 and 16.7 LPM) and calibration if required. Refer to Manual Sections 5.4 - 5.8 for procedures.

The Filter Relative Humidity (RH), Filter Temperature Sensor Test and Smart Heater Test should be performed annually. Refer to Instrument Manual for procedures.

Additional checks include the Beta detector count rate and dark count test check, zero background check, span foil check and should be performed annually.

Factory recalibration is not required except for units sent in for major repairs.

B5.2 Calibration Requirements for High-Volume PM10 Samplers (TE 6070 DV-BL)

Flow Verification/Calibration of the TE-6070DV-BL is to be performed upon initial installation, then quarterly and after any motor maintenance.

The TE-5028 is the preferred method to calibrate PM10 High Volume Air Samplers. It simulates change in the resistance by rotating the knob on the top of the calibrator. The infinite resolution lets the technician select the desired flow resistance. The TE-5028 calibration kit includes: 30" slack tube water manometer, adapter plate, 3' piece of tubing, and TE-5028A orifice with flow calibration certificate. Each annual calibration consists of five points, of which three must be within 36 to 44 CFM.

After calibration, the calculated % difference of calibrator versus sampler flow rates must be within +/-4%. Refer to Sampler Manual, Calibration Procedure for TE-6070DV-BL for complete calibration procedure, including the initial leak check requirement.

B5.3 Calibration Procedures for Meteorological Monitors

Meteorological sensors are calibrated in accordance with the EPA guidance and performed not less frequently than annually. Verifications and Calibrations will be performed in accordance with the manufacturer procedures as listed in the sensor manuals. Additional calibrations will be performed following any sensor repair or replacement.

B6 Data Acquisition Requirements

The BAM-1020 instruments produce signals which are transmitted to the Agiliaire 8872 data acquisition system via radio modem, where the signals are digitized and converted to engineering units and stored in electronic memory. The BAM 1020 units are polled hourly by the Agilaire 8872 data acquisition system located at S3. The data is then polled hourly via the AirVision server, housed at the CAS facility in Cleves, Ohio.

Data collected from S.H. Bell Chicago will be reviewed daily. Computerized inspection and visual inspection of these data will be performed daily using AirVision software. Values that fall outside of prescribed limits (Tables B-6, B-7, and B-8) will be evaluated by a data reviewer and corrections to data will be documented. Abnormal data values or problems will be reported as soon as possible to the CAS Project Manager who will initiate corrective action and determine if a special site visit is required.

Table B-6. Critical Criteria for PM10 Monitoring

Requirement	Frequency	Acceptance Criteria	Reference	Action
PM10 Continuous (BAM-1020)				
Sampling Period	Every 24 hours of operation	1440 minutes ± 60 minutes midnight to midnight local standard time	40 CFR Part 50, App. J Section 9.15	Verify prior to sampling
One Point Flow Rate Verification	1/month	≤±7% of transfer standard	40 CFR Part 58, App. A Section 3.2.3 3) Method 2.10 Table 3-1	If values outside acceptance criteria, leak-check/recheck flow
PM10 Filter-Based (TE 6070 DV-BL)				
Sampling Period	All filters	1440 minutes ± 60 minutes midnight to midnight local standard time	40 CFR Part 50, App. J Section 7.1.5	Verify prior to sampling
One Point Flow Rate Verification	1/3 months	≤±7% of transfer standard and 10% from design	40 CFR Part 58, App. A Section 3.2.3 3) Method 2.11 sec 3.5.1, Table 2-1	If values outside acceptance criteria, inspect/recheck flow

Table B-7. Operational Criteria for PM10 Monitoring

Requirement	Frequency	Acceptance Criteria	Reference	Action
PM10 Continuous (BAM-1020)				
System Leak Check	Within 5 days of beginning sampling; 1/month	1.0 SLPM	Method 2.11 sec 2.3.2	Check O-Rings Check Vacuum line to pump Inspect Nozzle
Multi-Point Flow Rate Verification	1/year following startup	3 of 4 cal points within + 10% of design	40 CFR Part 50 App J sec 8.0 2 and Method 2.10 Sec 2.2.4	If values outside acceptance criteria, leak-check/recheck
Semi-Annual Flow Rate Audit	1/6 months	16.67 SLPM ± 10%	40 CFR Part 58, App A, sec 3.2.4 and Method 2.10 Sec 7.1.5	Check O-Rings Check Vacuum line to pump Inspect Nozzle
Inlet/Downtube Cleaning	1/3 months	Clean	Method 2.10 sec 6.1.2	
PM10 Filter-Based (TE 6070 DV-BL)				
Multi-point flow rate Verification/Calibration	1/yr	3 of 4 cal points within + 10% of design	1, 2 and 3) Method 2.11 sec 2.3.2	Points outside acceptance criteria are repeated. If still outside, consult manufacturer's manual
Field Temp M-point Verification	at installation, then 1/yr	+ 2°C	1,2 and 3) Recommendation	
Semi Annual Flow Rate Audit	1/6 mo	+ 7% of transfer standard and 10% from design	1 and 2) 40 CFR Part 58, App A, sec 3.3.3 3) Method 2.11 sec 7 Table 7-1	Tighten VFC device to blower. Check for leaks at the orifice plate
Maintenance of Impactor Plate	1/month	Clean/Re-grease	Manufacturer recommendation	
Manufacturer-Recommended Maintenance	per manufacturers' SOP	per manufacturers' SOP	NA	

Table B-8. Systematic Criteria for PM10 Monitoring

Requirement	Frequency	Acceptance Criteria	Reference	Action
PM10 Continuous (BAM-1020)				
Sampler/Monitor	NA	Meets requirements listed in FRM/FEM/ARM designation	40 CFR Part 58 App C Section 2.1 NA 40 CFR Part 53 & FRM/FEM method list	
Siting	1/year	Meets siting criteria or waiver documented	40 CFR Part 58 App E, sections 2-5 Recommendation 40 CFR Part 58 App E, sections 2-5	
Data Completeness	24-hour quarterly	23 hours > 75%	Recommendation 40 CFR Part 50 App. K, sec. 2.3	
Reporting Units	all filters	µg/m3 at standard temperature and pressure (STP)	40 CFR Part 50 App K	
Verification/Calibration Standards and Recertification		*All standards should have multi-point certifications against NIST Traceable standards*		
Flow Rate Transfer Std.	1/yr	+ 2% of NIST-traceable Std.	1,2 and 3) 40 CFR Part 50 App J sec 7.3	
Field Thermometer	1/yr	+ 0.1° C resolution, + 0.1° C accuracy	1,2 and 3) Method 2.10 section 1.1.2	
Field Barometer	1/yr	+ 1 mm Hg resolution, + 5 mm Hg accuracy	1,2 and 3) Method 2.10 section 1.1.2	
Clock/timer Verification	1/6 mo	15 min/day	1,2 and 3) Method 2.10 sec 9	

Table B-8. Systematic Criteria for PM10 Monitoring (Continued)

Requirement	Frequency	Acceptance Criteria	Reference	Action
PM10 Filter-Based (TE 6070 DV-BL)				
Sampler/Monitor	NA	Meets requirements listed in FRM/FEM/ARM designation	40 CFR Part 58 App C, Section 2.1 NA 40 CFR Part 53 & FRM/FEM method list	
Siting	1/year	Meets siting criteria or waiver documented	40 CFR Part 58 App E, sections 2-5 Recommendation 40 CFR Part 58 App E, sections 2-5	
Data Completeness	quarterly	> 75%	1,2 and 3) 40 CFR Part 50 App. K, sec. 2.3b & c	
Reporting Units	all filters	µg/m3 at standard temperature and pressure	1,2 and 3) 40 CFR Part 50 App K sec. 1	
Precision				
Single analyzer	1/3 mo.	Coefficient of variation (CV) < 10% > 15 µg/m3	1,2 and 3) Recommendation	
Single analyzer	1/ yr	CV < 10% > 15 µg/m3	1,2 and 3) Recommendation	
Verification/Calibration Standards and Recertification		*All stds should have multi-point certifications against NIST Traceable stds*		
Flow Rate Transfer Std.	1/yr	+ 2% of NIST-traceable Std.	40 CFR Part 50, App.J sec 7.3 Method 2.11 Sec 1.1.3 40 CFR Part 50, App.J sec 7.3	
Field Thermometer	1/yr	+ 0.1° C resolution, + 0.5° C accuracy	1,2 and 3) Method 2.11 Sec 1.1.2	
Field Barometer	1/yr	+ 1 mm Hg resolution, + 5 mm Hg accuracy	1,2 and 3) Method 2.11 Sec 1.1.2	
Clock/timer Verification	4/year	5 min/mo	recommendation	

B7 Data Management

The proper management of all data is critical to assuring the quality and usability of the monitoring results. As such, procedures have been implemented to ensure robust data acquisition, validation, reduction, reporting, and storage of electronic data. PM10 monitoring data will be recorded and stored at the site using an Agilaire Model 8872 data logger. PM10 data will be retrieved from the monitoring site hourly via internet connection to the CAS AirVision file server. In addition, the monitoring site can be called from any computer having the correct software and the IP address and appropriate credentials.

All electronic calculations and statistical analyses will be performed using standard software (Microsoft Excel), Air Vision, and the software associated with the Agilaire Model 8872 data logger. All project documentation, records, data, and reports will be stored for at least five years following project completion. The data are stored on the Consolidated Analytical Systems server which are backed up nightly and are archived on and offsite.

PM10 data will be reviewed routinely by the CAS Data Manager asigned to this project. The CAS Data Manager reports directly to the CAS Project Manager. These data will be subjected to several levels of quality control, validation and quality assurance as discussed in Section D. Validated data are compiled into the final database for analysis and report preparation. The final database is processed and stored on the Consolidated Analytical Systems server and then archived on various storage media and maintained in duplicate in more than one location for protection.

The Data Manager will archive data on the network of Consolidated Analytical Systems and on secured servers which are backed up nightly and archived on and off-site.

PM10 Continuous Monitor (BAM-1020) Data Reporting

The PM10 hourly concentrations from continuous monitors will be reported on a monthly basis in accordance with the USEPA Region 5 RFI dated March 9, 2015 (USEPA, 2015, Appendix B, 18), within 14 days of the end of the month in which it was collected (i.e., continuous data collected March 1-31, 2017 will be reported by April 14, 2017.

High-Volume PM10 (TE 6070 DV-BL) Data Reporting

Reporting of the data from the PM10 filter-based samplers which require gravimetric analysis and determination of lead and toxic metals specified in the USEPA Region 5 RFI dated March 9, 2015 (USEPA, 2015, Appendix B, 4.e), will be in the format submitted by the contract laboratory.

Below is an example timeline detailing the sample collection and reporting process for filter-based samples. Please note that sampler pick-up for the High-Volume PM10s can vary by 2 days (e.g., if the sampler finishes collecting on a Friday at Midnight, the filter pick up will not be until Monday morning based on S.H. Bell's normal business operation hours).

- Days 0-6 - Samples are collected from S4HV1 and S4HV2 in accordance with the USEPA 3-day sampling schedule (Appendix C)
- Day 7 - On the first business day following the completion of the sampling events, the two samples are collected (one from S4HV1 and one from S4HV2).
- Day 8 - Samples are shipped to Intermountain Laboratories in Sheridan, Wyoming
- Day 9 - Transport to laboratory
- Day 10 - Laboratory check in
- Day 11-12 - Filter conditioning (pre-gravimetric analysis)
- Day 13-18 - ICP/MS analysis
- Day 19-20 - Report preparation by the laboratory
- Day 20-25 - CAS receipt and review and final QA/QC of the data
- Day 26 – Reporting*

*Note: Date received after the 26th will be included with the high-volume data for the following month.

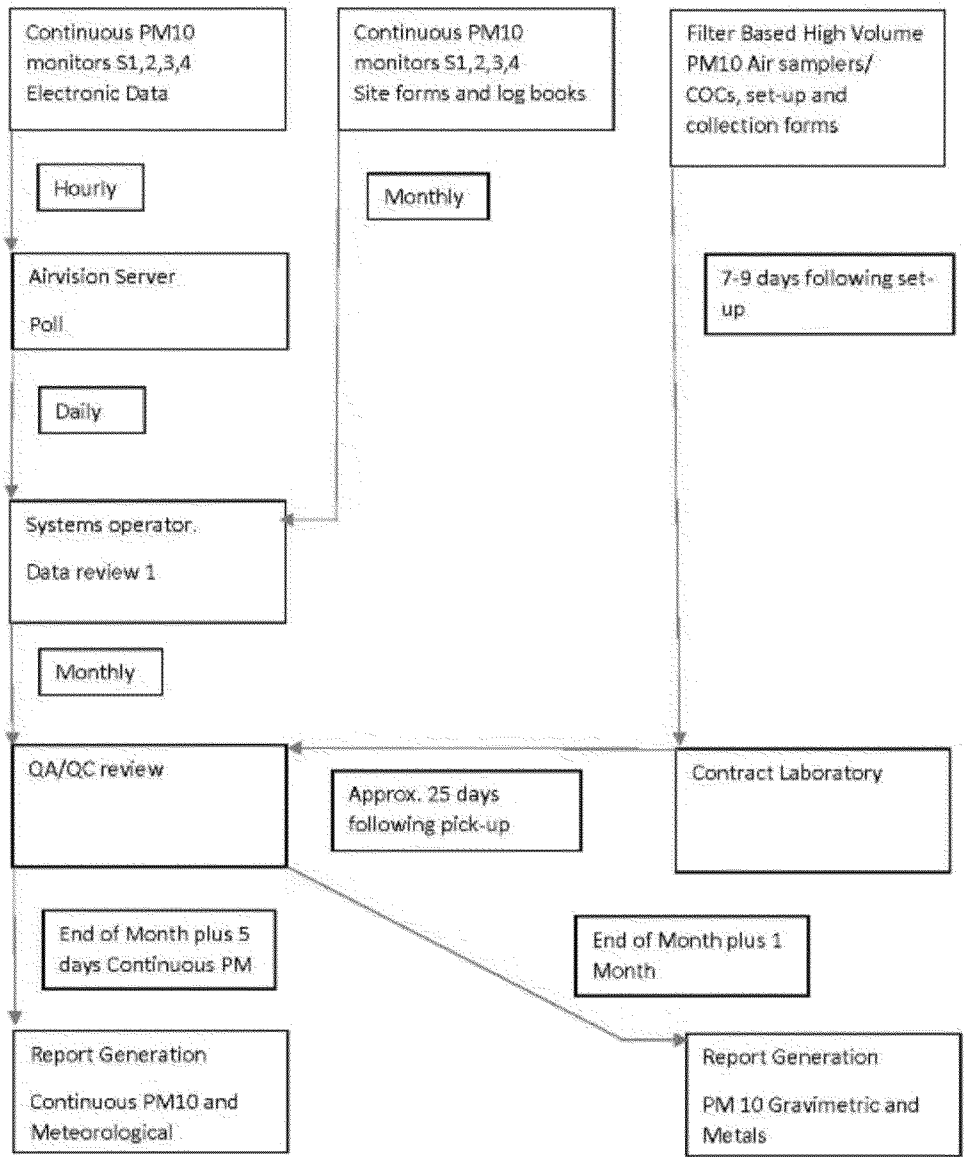
The appropriate reporting submittal schedule would be

- April 14, 2017 – Continuous PM10 data (March 1-31, 2017 sampling)
- May 1, 2017 – High-Volume PM10 data (March 1-31, 2017 sampling)
- May 14, 2017 – Continuous PM10 data (April 1-30, 2017 sampling)
- June 1, 2017 – High-Volume PM10 data (April 1-30, 2017 sampling)
- June 14, 2017 – Continuous PM10 data (May 1-31, 2017 sampling)
- June 1, 2017 – High-Volume PM10 data (May 1-31, 2017 sampling)

Data may also be marked with a qualifier code (Null Code) to denote suspect or invalid data if necessary.

Figure B-4 presents the data flow path for collecting, storing, and managing all data generated in the network.

Figure B-4. Data Management Tasks for S.H. Bell Chicago Monitoring Network



C. ASSESSMENT AND OVERSIGHT

C1 Assessment and Response Actions

The project team includes a quality assurance (QA) specialist who is responsible for independent assessment of the measurement efforts. This individual may be part of the same corporate organization as the project team, but performs no duties or holds no interests in the operation of any of the monitoring sites and networks that undergo audits. Assessments conducted for this project are divided into two categories: Technical Systems Audits and Performance Evaluations. Technical audits qualitatively document the degree to which the procedures and processes specified in the QAPP are followed. Performance evaluations quantitively test the ability of a measurement system to obtain acceptable results. Both provide information regarding the compliance of environmental data collection efforts as described in the QAPP. All performance and technical systems audits are conducted following the guidance documents in the "EPA Quality Assurance Handbook" series, Volumes I, II, and IV.

C1.1 Technical Systems Audits

Technical Systems Audits (TSAs) are conducted to determine the project personnel and equipment are functioning as prescribed in the QAPP. TSAs are performed onsite and may examine facilities, equipment, personnel, training, procedures, record keeping data validation, data management and analysis of a measurement system. The audit is conducted employing a checklist as a guide to the major topics to be assessed, and the auditor is free to allot greater amounts of time to any particular area as needed. A checklist is prepared in advance of the audit and is based on information presented in the QAPP and the guidance of the EPA QA Handbook series (USEPA, 2000).

From this assessment, the auditor is able to determine the level of adherence to the specifications relating to quality assurance objectives detailed in the QAPP. This review includes traceability documentation for standards and test equipment used to conduct quality control checks on pollutant monitors and meteorological sensors. Where the specification appears incomplete or inadequate, the auditor should be able to apply EPA guidance document information and personal experience in assessing whether the quality of the monitoring activity will produce defensible data. An example TSA field checklists for a BAM-1020 is presented in Figure C-1.

Figure C-1. Example TSA Checklist for BAM-1020

CONSOLIDATED ANALYTICAL SYSTEMS

BAM-1020 Audit Report

Customer	
Instrument	
ID/Serial No.	

Audit Performed by	
Date	
Location	

Flow Audits

Standard Used	Model	Serial Number	Calibration Date
Flow Reference Standard			
Temperature Standard			
Barometric Pressure Standard			

	as found	*as left*
Leak Check Value		

	as found		*as left*		N/A
	BAM	Ref. Std.	BAM	Ref. Std.	
Ambient Temperature					
Barometric Pressure					
Flow Rate (Actual Volumetric)					
Flow Rate (EPA Standard)					

Mechanical Audits

Note: Mark as found and/or as left box to reflect actions performed.

	as found	*as left*	
Pump muffler unclogged			
Sample nozzle clean			
Tape support vane clean			
Capstan shaft clean			
Rubber pinch rollers clean			
Chassis ground wire installed			N/A
PM10 particle trap clean			
PM10 drip jar empty			
PM10 bug screen clear			
PM2.5 particle trap clean			
Inlet tube water-tight seal OK			
Inlet tube perpendicular to BAM			

Figure C-1. (continued)

BAM-1020 Audit Report

Setup and Calibration Values

Parameter	Expected	Found
Clock Time/Date		
RS-232 Baud Rate	9600	
STATION #		
RANGE (mg)	0 - 1.000 mg	
BAM SAMPLE		
MET SAMPLE		
OFFSET		
CONC UNITS	mg/m3	
COUNT TIME (min)		
FLOW RATE		
CONC TYPE	STD	
FLOW TYPE	Actual	
Cv		
Qo		
ABS		
µ sw		
K Factor		
BKGD		
STD TEMP (°C)	-40 °C to 55 °C	
HEATER	Auto	
e1		
Errors	N/A	
AP		
FR1		
FRh		
Password	f1 f2 f3 f4	
Cycle Mode	Standard	
RH Control	yes	
RH Setpoint (%)		
Datalog RH	yes	
Delta-T Control	no	
Delta-T Setpoint (°C)		
Datalog Delta-T	no	

Figure C-1. (continued)

CONSOLIDATED ANALYTICAL SYSTEMS

BAM-1020 Audit Report

Analog Voltage Output Audit — Relevant? No

DAC Test Screen	BAM Voltage Output (Volts)	Logger Voltage Input (Volts)
0.000 Volts		
0.500 Volts		
1.000 Volts		

Membrane Audit

LAST m (mg)	
ABS (mg)	
Difference (mg)	0
% Difference	#DIV/0!

Flow Control Range

Flow Setpoint	BAM Flow
15.0 LPM	
16.7 LPM	
18.4 LPM	

Last Six Errors in BAM-1020 Error Log

	Error	Date	Time
1			
2			
3			
4			
5			
6			

Notes

Recommendations

Signatures — Date

Service Technician		
Reviewer		

C1.2 Performance Evaluation Audits

Continuous PM10 monitor and FRM sampler performance audits consist of a leak check, a flow rate measurement accuracy check, and verification of the temperature and pressure transducer measurement accuracy (for continuous monitors).

Performance audits for meteorological sensors are accomplished by direct comparison with an audit standard. For the wind direction sensor, the offset of the sensor with the vane turned to a series of known directions is assessed, as is the orientation of the vane with respect to true north. The wind speed sensor is tested using a traceable certified motor drive unit. The ambient temperature and barometric pressure audits are conducted using collocated audit standards. A digital thermistor unit with certified traceability is used for temperature and a traceable barometer is used to test the site pressure transducer.

C2 Reports to Management

Reports for field performance and technical systems audits include a statement of the scope of the audit, summary presentation of results, specific observations or findings related to the specifications under review. The field data and traceability documents for each audit standard employed are included. The auditor should always provide the field technician and/or the operations task leader a list of preliminary findings and recommendations during a debriefing meeting held at the conclusion of the audits. If significant deficiencies are determined that impact the ability of the system to properly function, the CAS Project Manager will be notified immediately. The CAS Project Manager will notify S.H. Bell representatives of the situation. A formal report should be provided to the project team within two weeks of completion of the audits. If there are no corrective action items, the auditor may close the audit. If further action is required, the audit will be classified as open pending verification that the corrective action was completed and the audit specification is being met. This information will be supplied to EPA as part of the standard reporting effort.

The designated project team member will have the responsibility for follow-up on audit recommendations and provide a written response to the findings and communicate the outcome of the corrective action effort. This is typically the Field Installation/Operations Manager for the field network. If the auditor does not receive a response or the response is inadequate, he must communicate the situation to the Project Manager.

Accuracy, precision, and completeness statistics are also computed for each measurement as applicable, per the quality assurance guidance in 40 CFR Part 58, Appendix A. A review of laboratory detection limits will be conducted to ensure that the reported limits meet the nominal values stated in this QAPP. The computations for flow rate measurement accuracy are as described in Volume II and the computations for meteorological measurement accuracy are as described in Volume IV of the EPA QA Handbook (USEPA, 2013 and USEPA, 2008, respectively).

Precision of PM10 measurements between the two methods that areemployed is evaluated by least squares regression slope comparison of FEM and FRM PM1 0 data for sample data pairs <60µg/m3 at S.H. Bell Chicago monitoring Site S4, wherehese samplers are co-located. Laboratory analysis precision is compared to the method requirements for analytical duplicate analyses.

Completeness is calculated as the ratio of valid samples or hou rs of data compared to the total planned number of samples or operational hours of data at tempted to be collected, expressed as a percentage.

Accuracy data are generated by the audit staff, as the spreadsh eet results from measurement audits. Precision data are generated by the data management staff, in the form of statistics created from precision check data, or QC data from the subcontracted laboratory as required by the analytical method. Completeness data are also generated by the data management staff, using an automated reporting script integrated into the RAQIS database.

D. DATA VALIDATION AND USABILITY

D1 Data Review, Validation, and Verification Requirements

Data review, validation, and verification procedures are presented in this section. Three types of data are collected for this project: continuous data from PM10 monitors, gravimetric and speciation data from manual samplers, and continuous data from meteorological sensors. Collected data is specific to the function of each device. Daily data review is the responsibility of the data management task leader for the project, in parallel with operations staff. The task leader also performs the routine monthly review and validation functions or delegates and supervises them.

In the event the daily data review indicates any irregularity or elevated result, the reviewer notifies the Project Manager and Data Management task leader. All abnormal data is to be be flagged. The data editor gathers all pertinent QC data for the date and time of the result of interest and reports to the project manager regarding the validity of the measured values. This typically occurs within 24 hours of first discovery of the situation. If the measurements are valid, the Project Manager immediately notifies S.H. Bell and provides associated meteorological data so that the client may investigate any potential events or sources that could have contributed to the result of interest.

Analytical laboratory reports for manual samples will be forwarded in electronic format and loaded into the database. The data management task leader is responsible for ensuring that the data are properly loaded and the supporting documentation is in the central project file.

Data will be declared invalid whenever documented evidence exists demonstrating that a monitor, sampler, or meteorological sensor was not collecting representative conditions or was malfunctioning. In rare cases where data offset is continuous measurements can be verified, a factor may be applied to the averages in a data set with clear identification of the affected data. The project data documentation files will contain the supporting documentation of the use of and justification for the factor.

Data validation will be performed or supervised for each monthly data set by the data management task leader. The data management task leader will verify that the continuous monitor data and the meteorology measurement data are complete for the month, and then initiate the validation process.

All continuously generated data is stored on the data logging system (DAS) and is transferred via cellular modem during the daily automated network data retrieval routine. The activities involved in validation of the data in general include the following:

- Reviewing all site visit logs, calibration data, audit data, and other relevant information for indications of malfunctioning equipment or instrument maintenance/calibration events;
- Reviewing each laboratory report
- Reviewing all available BAM-1020 performance data
- Examining the continuous PM10 and meteorological data for outliers in the data, unusual persistence, unusually high rates of change, or measurement values that seem incongruous with normal measurement ranges and/or diurnal variations.

Any Suspect data is flagged and subject to further examination and review prior to being invalidated. The cause of abnormal or unavailable data is investigated and determined. The results from all quality control and quality assurance checks are evaluated to determine if the data quality objectives for each measurement are being met. Evidence of measurement bias, external influences on the representativeness of the data, or lack of reproducibility of the measurement data may be cause for the data to be considered invalid.

After the edit and validation review is complete, the editor returns a set of instructions to the data manager for application to the data set. The final edited version of the data is produced and peer reviewed to ensure that the edits were properly applied and that the validation process was consistent with project requirements and applicable guidelines. A record of the edit instructions is retained in the project files, as is the final data product (Validated Data). Once the project manager has reviewed and approved the edited data set, it is released and reported to the client.

D2 Reconciliation with Data Quality Objectives

Periodically the project progress is evaluated to assess measurement goals and data collection efforts. This evaluation will occur at a minimum on an annual basis. Two areas will be reviewed: the performance of the project in respect to the quality goals specified in the QAPP and the limitations (if any) on the measurement data for their intended use.

D2.1 Assessment of Measurement Performance

As part of the annual review, the performance of the monitoring network will be assessed to determine if the requirements of the data user are met. (client and/or regulatory agency). Key indicators relating to precision, accuracy, completeness, representativeness, and comparability goals for the monitoring effort are evaluated. Specific quantitative measures of precision, accuracy, and completeness are defined for use in estimating the quality of the data set. These measures will be calculated and compared to the goals for the project.

D2.2 Data Quality Assessment

If any of the data quality measures deviate from established performance objectives (e.g., an audit result outside the project specification or a monthly completeness less than the project goal) the data is not considered useless without further examination. The burden is on the project team to determine the extent to which a quality issue affects the related data, and ultimately how the issue impacts the fitness for use of the data.

A single isolated incident affecting the performance objective does not automatically render the data invalid, but rather reduces the confidence that the measurement is reliable, and indicates that increased quality control measures are needed. Any data confidence question should be appropriately flagged in the database. The data quality objectives are assessed periodically throughout the monitoring effort. A month in which the completeness statistic for a given site is below the objective is cause for concern and corrective action, but if the other months are within the objective the confidence in the complete data set should remain high.

Any potential limitations of the validated data set will be identified and communicated. The project team will present all known or potential limitations on the data with each data submittal, and will clearly flag any such data so that users may determine if the data should be used for a particular conclusion or decision.

E. REFERENCES

MetOne (2008), *BAM 1020 Particulate Monitor Operations Manual, BAM-1020-9800, Rev H*, MetOne Instruments, Inc., Grants Pass, OR.

S.H. Bell Company 2016 – 2017. *"Response to Request to Provide Information Pursuant to the Clean Air Act, Appendix B, PM10 Monitors and Siting, Proposed Monitoring Sites and Locations", January4, 2017.* (Monitoring Plan), *Amendments and revisions as noted below:*

- *01/11/2017 – USEPA Region 5 Email from Nicole Cantello "S.H. Bell Company Chicago, S. Avenue O Terminal – Monitoring and Siting" (request for clarification to proposed monitoring site selection)*
- *01/18/2017 – S.H. Bell Letter "Response to January 12, 2017 (sic) Email Request to Provide Justification for Monitor Site Selection"*
- *01/25/2017 – Conference Call between USEPA Region 5 and S.H. Bell (request for evaluation of PS2, PS2.1, PS2.2, and PS2.3)*
- *01/30/2017 – S.H. Bell S. Letter Response to January 12, 2017 (sic) Email Request to Provide Justification for Monitor Site Selection (Response to 01/25/2017 conference call requesting written evaluation of PS2, PS2.1, PS2.2, PS2.3)*
- *02/02/2017 – Conference Call between USEPA Region 5, the City of Chicago, S.H. Bell, Eckert Seamans Cherin & Mellot, LLC and Consolidated Analytical Systems, Inc. (request to re-evaluated alternative proposed monitoring site PS2.2)*
- *02/06/2017 – S.H. Bell Letter "Response to January 12, 2017 (sic) Email Request to Provide Justification for Monitor Site Selection" (Re-Evaluation of alternative proposed site PS2.2)*
- *02/07/2017 - USEPA Region 5 Email from Nicole Cantello "S.H. Bell Company Chicago, S. Avenue O Terminal – Monitoring and Siting" (request to locate proposed monitoring site PS2.2)*
- *02/10/20117 – S.H. Bell Letter "Response to February 7, 2017 Email Request to Locate Proposed Monitoring Site PS2.2"*
- *02/13/2017 – USEPA Region 5 Email from Nicole Cantello "S.H. Bell Company Chicago, S. Avenue O Terminal – Monitoring and Siting" (request to resubmit S.H. Bell siting plan for approval)*
- *02/24/2017 - USEPA Region 5 Email from Nicole Cantello "S.H. Bell Company Chicago S. Avenue O Terminal -QAAP" (providing links to be researched in the development of the site specific QAPP)*
- *03/02/2017 - USEPA Region 5 Email from Nicole Cantello "S.H. Bell Company Chicago S. Avenue O Terminal – Monitoring and Siting" (approval of the S.H. Bell Siting Plan)*
- *03/10/2017 – S.H. Bell Letter "Letter Updates to S.H. Bell's December 30, 2016 Response to: Request to Provide Information Pursuant to the Clean Air Act Appendix B, PM10 Monitors and Siting Proposed Monitoring Sites and Locations"*

(Tisch Environmental, Inc. 2010), *OPERATIONS MANUAL, TE-6000 Series TE-6070, TE-6070-BL, TE-6070D, TE-6070D-BL TE-6070V, TE-6070V-BL, TE-6070DV, TE-6070DV-BL, PM10, Particulate Matter 10 Microns and less High Volume Air Sampler, U.S. EPA Federal Reference Number RFPS-0202-141"*, Tisch Environmental, Inc., Village of Cleves, OH, August 10, 2010.

(USEPA, 1994) – United States Environmental Protection Agency, "*Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 1 --A Field Guide to Environmental Quality Assurance*", EPA-600/R-94/038a, April 1994.

(USEPA, 1999a) – United States Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio "*Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air, Compendium Method IO-2.1, Sampling of Ambient Air for Total Suspended Particulate Matter (SPM) and PM10 Using High Volume (HV) Sampler*", EPA/625/R-96/010a., June 1999.

(USEPA, 1999b) – United States Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio "*Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air, Compendium Method IO-3.1, Selection, Preparation and Extraction of Filter Material*", EPA/625/R-96/010a, June 1999.

(USEPA, 1999c) – United States Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio "*Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air, Compendium Method IO-3.5, Determination of Metals in Ambient Particulate Matter Using Inductively Coupled Plasma/Mass (ICP-MS) Spectroscopy*", EPA/625/R-96/010a., June 1999.

(USEPA, 2000a) – United States Environmental Protection Agency, "Guidance on Technical Audits and Related Assessments for Environmental Data Operations, EPA QA/G-7 Final", EPA/625/R-99/080a., January 2000.

(USEPA, 2000b) – United States Environmental Protection Agency, "*On-Site Meteorological Program Guidance for Regulatory Modeling Applications*", EPA 454/R-99-005, February 2000.

(USEPA, 2001) – United States Environmental Protection Agency, "*EPA Requirements for Quality Assurance Project Plans*", EPA QA/R-5, March 2001.,

(USEPA, 2002) – United States Environmental Protection Agency, "*EPA Guidance for Quality Assurance Project Plans*", EPA QA/G-5, EPA/600/R-02/009, December 2002.

(USEPA, 2008) – United States Environmental Protection Agency, "*Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV –Meteorological Measurements Version 2.0 (Final)*", EPA-454/B-08-002, March 2008.

(USEPA, 2013) – United States Environmental Protection Agency, "*Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II --Ambient Air Quality Monitoring Program*", EPA-454/B-13-003, May 2013.

(USEPA, 2015) – United States Environmental Protection Agency Region 5, "*Request to Provide Information Pursuant to the Clean Air Act*", March 9, 2015.

Appendix A: Example Calibration Data Spreadsheets and Operator Checklists

CONSOLIDATED ANALYTICAL SYSTEMS

TE-6070V Sample Worksheet
(Using G-Factor)

Customer Co./Org.	S.H. Bell
Customer Contact	Jim Langbehn
Project No.	17-3007
Insturment Model	TE-6070V
ID/Serial No.	
Instrument Site	S4
Sample ID	
VFC G-Factor	0.0251890900

Date	
Technician Initials	
Location	Chicago, IL
Sample Start Date	
Sample End Date	
Service	Sample
Filter Number	

Ambient Conditions Set-up

Temp (deg F):			**Clean Filter ΔP**	
Ta (deg K):	255		**Barometric Press (in Hg):**	
Ta (deg C):	-17.8		**Pa (mm Hg):**	0.0

Ambient Conditions Sample

Temp (deg F):			**Loaded Filter ΔP**	
Ta (deg K):	255		**Barometric Press (in Hg):**	
Ta (deg C):	-17.8		**Pa (mm Hg):**	0.0

Calculate Total Air Volume Using G-Factor

Enter Average Temperature During Sampling Duration (Deg F)	
Average Temperature During Sampling Duration (Deg K)	255.22
Enter Average Barometric Pressure During Sampling Duration (In Hg)	
Average Barometric Pressure During Sampling (mm Hg)	0.00
Enter Clean Filter Sampler Inches of Water	
Enter Dirty Filter Sampler Inches of Water	
Average Filter Sampler (mm Hg)	#DIV/0!
Enter Total Runtime in Hours (xx.xx)	

Po/Pa #DIV/0!

Calculated Flow Rate (m3/min) #DIV/0!

Total Flow (m3) #DIV/0!

Calculations

Calibrator Flow (Qa) = 1/Slope*(SQRT(H20*(Ta/Pa))-Intercept)

Pressure Ratio (Po/Pa) = 1-Pf/Pa

% Difference = (Look Up Flow-Calibrator Flow)/Calibrator Flow*100

NOTE: Ensure calibration orifice has been certified within 12 months of use

CONSOLIDATED ANALYTICAL SYSTEMS

TE-6070V Sampler Calibration Worksheet
(Using G-Factor)

Customer Co./Org.	S.H. Bell
Customer Contact	Jim Langbehn
Project No.	17-3007
Insturment Model	TE-6070V
ID/Serial No.	P10244BL
Instrument Site	S4
VFC G-Factor	0.0251890900

Date	March 1, 2017
Technician Initials	
Location	Chicago, IL
Time of arrival	8:00
Time of departure	17:00
Service	Calibration

Ambient Conditions

Temp (°F)	44.2	**BP (in Hg)**	28.94
Ta (°K)	280	**Pa (mm Hg):**	734.3
Ta (°C)	6.8		

Calibration Orifice

Make	Tisch
Model	TE-5028A
Serial #:	3303
Qa Slope (m):	0.93771
Qa Int (b):	0.00061
Calibration Due Date:	03/01/17

Calibration Information

Run Number	Orifice "H2O	Qa m3/min	Sampler "H2O	Pf mm Hg	Po/Pa	Calculated m3/min	% of Diff
1	1.50	0.806	2.80	5.226	0.993	1.188	47.42
2	1.50	0.806	3.30	6.159	0.992	1.186	47.30
3	1.50	0.806	3.40	6.345	0.991	1.186	47.17
4	1.40	0.778	4.70	8.771	0.988	1.182	51.91
5	1.40	0.778	6.00	11.198	0.985	1.178	51.27

Calculate Total Air Volume Using G-Factor

Enter Average Temperature During Sampling Duration (Deg F)	62.00
Average Temperature During Sampling Duration (Deg K)	289.67
Enter Average Barometric Pressure During Sampling Duration (In Hg)	29.40
Average Barometric Pressure During Sampling (mm Hg)	746.76
Enter Clean Filter Sampler Inches of Water	13.30
Enter Dirty Filter Sampler Inches of Water	14.00
Average Filter Sampler (mm Hg)	25.47
Enter Total Runtime in Hours (xx.xx)	24.00
Po/Pa	0.966
Calculated Flow Rate (m3/min)	1.172
Total Flow (m3)	1687.68

Calculations

Calibrator Flow (Qa) = 1/Slope*(SQRT(H20*(Ta/Pa))-Intercept)
Pressure Ratio (Po/Pa) = 1-Pf/Pa
% Difference = (Look Up Flow-Calibrator Flow)/Calibrator Flow*100

NOTE: Ensure calibration orifice has been certified within 12 m onths of use

Appendix B: **Example Chain-of-Custody Form**

Inter-Mountain Labs

Sheridan, WY and Gillette, WY

- CHAIN OF CUSTODY RECORD -

All shaded fields must be completed.

This is a legal document; any misrepresentation may be construed as fraud.

#WEB 10101

Client Name	Project Identification	Sampler (Signature/Attestation of Authenticity)	Telephone #
Consolidated Analytical Systems (CAS)	S.H. Bell - Chicago, IL		513-542-1200

Report Address	Contact Name	
201 S. Miami Avenue Cleves, OH 45002	Meredith Cloran	
	Email	mcloran@cas-en.com
Invoice Address	Phone	513-542-1200
201 S. Miami Avenue Cleves, OH 45002	Purchase Order # 17-2507	Quote # CAS1702231

ITEM	LAB ID (Lab Use Only)	DATE SAMPLED	TIME SAMPLED	SAMPLE IDENTIFICATION	Matrix	# of Containers	PM10 Gravimetric A	IO-3.1 for air filters	IO-3.5 Metals on air						REMARKS
1		03/02/17		S4HV1-030217-R	FT	1	x	x	x						See Field Envelope
2		03/05/17		S4HV2-030517-R	FT	1	x	x	x						See Field Envelope
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															

ANALYSES / PARAMETERS

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME

SHIPPING INFO	MATRIX CODES		TURN AROUND TIMES	COMPLIANCE INFORMATION		ADDITIONAL REMARKS
☐ UPS	Water	WT	Check desired service	Compliance Monitoring ?	Y	Collected 03/07/17
☐ FedEx	Soil	SL	☐ Standard turnaround	Program (SDWA, NPDES,…)	CAA 114a	Field conditions at collection:
☐ USPS	Solid	SD	☐ RUSH - 5 Working Days	PWSID / Permit #		
☐ Hand Carried	Filter	FT	☐ URGENT - < 2 Working Days	Chlorinated?	N	
☐ Other_____	Other	OT	*Rush & Urgent Surcharges will be applied*	Sample Disposal: Lab x	Client	

IML Air Science
555 Absaraka
Sheridan, WY 82801
(307) 674-7506
www.imlairscience.com

Particulate Sampler Field Envelope

Network _____ Sampler ID _____

Filter Number _____

Sample Date _____

Time Off _____

Time On _____

Run Time _____

Tech. _____

P_{STG}

ΔP on	ΔP off

units

Comments:

_____

_____

_____

_____

_____

Appendix C: **USEPA (3-day) Sampling Schedule, 2017**

EPA Sampling Schedule 2017

Important Dates

Notes

3-Day schedule is shown in orange, green, and purple

6-Day schedule is shown in green and purple

12-Day schedule is shown in purple

January

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

March

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

April

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

May

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

June

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

July

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

August

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

September

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

October

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

November

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Appendix D: **S.H. Bell Siting Plan**

SHBELLCO
HANDLING WITH CARE • LME APPROVED

January 4, 2017

United States Environmental Protection Agency, Region 5
Air and Radiation Division
Attn: Katharine Owens (Owens.katharine@epa.gov), Nicole Contello (Cantello.nicole@epa.gov), George T. Czerniak, and R5enforcement@epa.gov
77 W. Jackson Blvd
Chicago, IL 60604

RE: **S.H. Bell Company**
10218 South Avenue O
Chicago, Illinois 60617
Response to: Request to Provide Information Pursuant to the Clean Air Act
Appendix B, PM_{10} Monitors and Siting
Proposed Monitoring Sites and Locations

Dear Ms. Owens:

S.H. Bell is pleased to submit this response to USEPA Region 5 Air and Radiation Division's Request to Provide Information Pursuant to the Clean Air Act dated March 9, 2015. This response addresses Appendix B Items 2 and 3, PM_{10} Monitors and Siting.

PM_{10} MONITORS AND SITING

Appendix B, 2

Question: Within 30 days of receipt of this information request, SHB shall submit proposed monitoring site locations for continuous Federal Equivalent Method (FEM) real-time PM10 monitoring and Federal Reference Method (FRM) PM10 filter-based monitoring at the facility for EPA review and approval prior to establishing the monitoring sites.

Response: A site location and vicinity map of the S.H. Bell facility located at 10218 South Avenue O, Chicago, Illinois 60617 is attached as Figure 1. Proposed monitoring site locations for FEM real-time PM10 monitoring and FRM PM10 filter-based monitoring are shown on Figure 2. Rationale for site selection is detailed below. Historical wind rose data is included in Attachment 1.

Appendix B, 3

Question: Within 30 days of receipt of this request, SHB shall submit to EPA a map showing the property lines of the facility, the location of nearby residences and industrial properties and proposed locations of monitoring sites.

Response: A site location map of the S.H. Bell facility located at 10218 South Avenue O, Chicago, Illinois 60617 and the surrounding area (including nearby residences and industrial properties) is attached as Figure 1. Proposed monitoring site locations for FEM real-time PM10 monitoring and FRM PM10 filter-based monitoring are shown on Figure 2.

MONITORING SITE SELECTION RATIONALE

S.H. Bell has selected four proposed monitoring locations as shown on Figure 2. Proposed monitoring locations are identified as PS1, PS2, PS3, and PS4. The S.H. Bell facility has an existing meteorological tower, denoted as ESM on Figure 2. Each of the four proposed monitoring locations (PS1, PS2, PS3, and PS4) will have FEM real-time PM_{10} monitors. One of the four proposed monitoring sites, PS4, which is located at the furthest downwind location on the S.H. Bell property, will also have an FRM PM_{10} filter-based monitor. Meteorological data will be collected at the existing meteorological tower.

Probe siting information and site configuration for the proposed monitoring locations were selected in accordance with 40 CFR Part 58, Appendix E. Because of the urban nature of the S.H. Bell facility, particular attention is given to the following sections of the siting criteria:

- 2. Horizontal and Vertical Placement
  Microscale Pb, PM_{10}, $PM_{10-2.5}$, and $PM_{2.5}$ sites are required to have sampler inlets between 2 and 7 meters above ground level.

  The probe or at least 90 percent of the monitoring path must be at least 1 meter vertically or horizontally away from any supporting structure, walls, parapets, penthouses, etc., and away from dusty or dirty areas. If the probe or a significant portion of the monitoring path is located near the side of a building or wall, then it should be located on the windward side of the building relative to the prevailing wind direction during the season of highest concentration potential for the pollutant being measured.

- 4. Spacing From Obstructions
  a. Buildings and other obstacles may possibly scavenge SO_2, O_3, or NO_2, and can act to restrict airflow for any pollutant. To avoid this interference, the probe, inlet, or at least 90 percent of the monitoring path must have unrestricted airflow and be located away from obstacles. The distance from the obstacle to the probe, inlet, or monitoring path must be at least twice the height that the obstacle protrudes above the probe, inlet, or monitoring path. An exception to this requirement can be made for measurements taken in street canyons or at source-oriented sites where buildings and other structures are unavoidable.
  b. Generally, a probe or monitoring path located near or along a vertical wall is undesirable because air moving along the wall may be subject to possible removal mechanisms. A probe, inlet, or monitoring path must have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. For particle sampling, a minimum of 2 meters of separation from walls, parapets, and structures is required for rooftop site placement.

Table E-4 of Appendix E to Part 58 —Summary of Probe and Monitoring Path Siting Criteria (in particular Notes 3, 4, 5, and 8).

Pollutant	Scale (maximum monitoring path length, meters)	Height from ground to probe, inlet or 80% of monitoring path 1 (meters)	Horizontal and vertical distance from supporting structures 2 to probe, inlet or 90% of monitoring path1 (meters)	Distance from trees to probe, inlet or 90% of monitoring path 1 (meters)	Distance from roadways to probe, inlet or monitoring path 1 (meters)
SO_2 3 4 5 6	Middle (300 m) Neighborhood Urban, and Regional (1 km)	2-15	>1	>10	N/A.
CO 4 5 7	Micro [downtown or street canyon sites], micro [near-road sites], middle (300 m) and Neighborhood (1 km)	2.5-3.5; 2-7; 2-15	>1	>10	2-10 for downtown areas or street canyon microscale; ≤50 for near-road microscale; see Table E-2 of this appendix for middle and neighborhood scales.
O_3 3 4 5	Middle (300 m) Neighborhood, Urban, and Regional (1 km)	2-15	>1	>10	*See* Table E-1 of this appendix for all scales.
NO_2 3 4 5	Micro (Near-road [50-300 m])	2-7 (micro);	>1	>10	≤50 for near-road micro-scale.
	Middle (300 m)	2-15 (all other scales)			
	Neighborhood, Urban, and Regional (1 km)				*See* Table E-1 of this appendix for all other scales.
Ozone precursors (for PAMS) 3 4 5	Neighborhood and Urban (1 km)	2-15	>1	>10	*See* Table E-4 of this appendix for all scales.
PM, Pb 3 4 5 8	Micro, Middle, Neighborhood, Urban and Regional	2-7 (micro); 2-7 (middle $PM_{10-2.5}$); 2-7 for near-road; 2-15 (all other scales)	>2 (all scales, horizontal distance only)	>10 (all scales)	2-10 (micro); *see* Figure E-1 of this appendix for all other scales. ≤50 for near-road.

N/A – Not applicable

1 Monitoring path for open path analyzers is applicable only to middle or neighborhood scale CO monitoring, middle, neighborhood, urban, and regional scale NO_2 monitoring, and all applicable scales for monitoring SO_2, O_3, and O_3 precursors.

2 When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

3 Should be greater than 20 meters from the dripline of tree(s) and must be 10 meters from the dripline when the tree(s) act as an obstruction

4 Distance from sampler, probe, or 90 percent of monitoring path to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler, probe, or monitoring path. Sites not meeting this criterion may be classified as middle scale (*see* text).

5 Must have unrestricted airflow 270 degrees around the probe or sampler; 180 degrees if the probe is on the side of a building or a wall.

6 The probe, sampler, or monitoring path should be away from minor sources, such as furnace or incineration flues. The separation distance is dependent on the height of the minor source's emission point (such as a flue), the type of fuel or waste burned, and the quality of the fuel (sulfur, ash, or lead content). This criterion is designed to avoid undue influences from minor sources.

7 For micro-scale CO monitoring sites, the probe must be >10 meters from a street intersection and preferably at a midblock location.

8 Collocated monitors must be within 4 meters of each other and at least 2 meters apart for flow rates greater than 200 liters/min or at least 1 meter apart for samplers having flow rates less than 200 liters/min to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

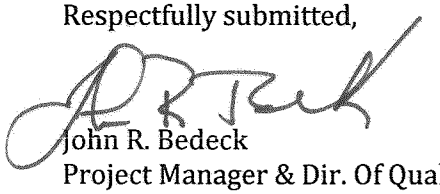
SUMMARY

S.H. Bell looks forward to USEPA's review and approval of responses to Appendix B questions 2 and 3 and to installing, operating, and maintaining ambient monitoring sites at the facility upon your approval of the proposed plan. Should you have any questions about the proposed monitoring locations, please let me know.

CERTIFICATION

> I certify under penalty of law that I have examined and am familiar with the information in the enclosed documents, including all attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are, to the best of my knowledge and belief, true and complete. I am aware that there are significant penalties for knowingly submitting false statements and information, including the possibility of fines or imprisonment pursuant to Section 1(c)(2) of the Clean Air Act and 18 U.S.C. §§ 1001 and 1341.

Respectfully submitted,



John R. Bedeck
Project Manager & Dir. Of Quality
S.H. Bell Company

Prepared by:
Consolidated Analytical Systems, Inc.

Figure 1
Site Location and Vicinity Map
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

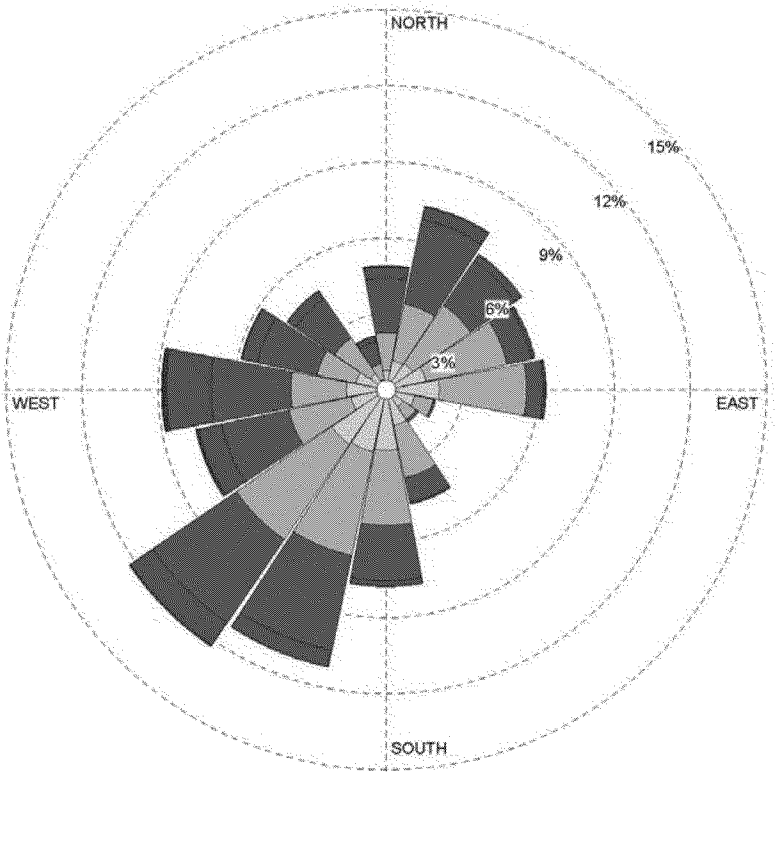
Figure 2
Proposed and Existing Monitoring Locations
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

Site ID	Latitude	Longitude
PS1	41.708264	-87.544006
PS2	41.708291	-87.540184
PS3	41.710494	-87.542090
PS4	41.711527	-87.539628
EMS	41.709861	-87.539692

Attachment 1
Historical Wind Rose Data (October 2014 thru October 2016)
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

WIND ROSE PLOT:
SH Bell Chicago Terminal Met Station

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
Entire period	**Start Date: 10/11/2014 - 00:00** **End Date: 10/31/2016 - 23:00**	MODELER:	
	CALM WINDS: **0.49%**	TOTAL COUNT: **17996 hrs.**	
	AVG. WIND SPEED: **3.30 m/s**	DATE: **11/11/2016**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

SH BELL CO
HANDLING WITH CARE • LME APPROVED

January 18, 2017

United States Environmental Protection Agency, Region 5
Air and Radiation Division
Attn: Nicole Cantello (Cantello.nicole@epa.gov), George T. Czerniak, and R5enforcement@epa.gov
77 W. Jackson Blvd
Chicago, IL 60604

RE: **S.H. Bell Company**
10218 South Avenue O
Chicago, Illinois 60617
Response to January 12, 2017 Email Request to Provide Justification for Monitor Site Selection

Dear Ms. Cantello:

S.H. Bell is pleased to submit this response to USEPA Region 5 Air and Radiation Division's Request for clarifications to proposed monitoring site selection dated January 12, 2017. This response addresses questions posed in your email "S.H. Bell Company Chicago S. Avenue O Terminal - Monitoring and Siting" dated January 12, 2017.

Question: Could you provide a justification for your choice of location for each monitor site?

Response: The monitoring locations proposed were selected with two goals in mind: 1) meet USEPA siting criteria (40 CFR Part 58, Appendix E), and 2) collect data that provides an accurate representation of particulate matter (PM) concentrations across the site, with respect to predominant wind direction. The predominant wind direction in the vicinity of the site is from southwest to northeast – see attached Site Location Maps and historical wind rose data from October 2014 – October 2016. Proposed Site 1 (PS1) is proposed to be located at the southwesternmost corner (upwind) of the property in order to determine concentrations of PM that may be entering the site from offsite sources. The site is surrounded by industrial properties along the Calumet River. PS4 is proposed for the northeasternmost corner (downwind) of the property to most accurately reflect PM concentrations in air mass leaving the site; thereby helping determine impact to adjacent and surrounding properties and receptors. PS2 is located at the southeast corner of the property, nearest adjacent residential areas to measure potential impact to offsite receptors. Site PS3 was selected to provide 360 degrees of data capture given the other three proposed site locations.

Question: We view the location of SH Bell's main office to be a prime siting location and would like to understand why SH Bell did not propose that location. Could you please indicate whether SH Bell considered the main office site (which already has an electricity source) as a siting location for monitors?

Response: The location near the main office does not provide 270 degrees of clearance required to meet USEPA siting criteria. Additionally, several trees are located in this area and would require removal. The height of the trees and the effective drip line of the trees that are present both on and off SH Bell property would adversely affect air flow, which violates USEPA siting criteria. Also, a berm is located near the main office building which would adversely affect representative air flow from reaching the inlet to the PM monitor.

Question: Did SH Bell consider a site between the two buildings on the southern facility border? EPA's preference would be to merge the two monitors on the southern border and locate one monitor there, and to use the main office location as the site for one FRM monitor and one FEM monitor.

Response: Please see response to #1 above. Based on site configuration and historical wind rose data, SH Bell believes the most representative locations to monitor PM concentrations in air mass entering and exiting the site are at locations PS1 and PS4. The location on the southern property boundary is also located adjacent to an active rail line; therefore, this location was omitted from consideration as a monitoring site.

SUMMARY

S.H. Bell looks forward to USEPA's review and approval of responses to questions regarding monitoring site selection. Should you have any additional questions about the proposed monitoring locations, please let me know.

CERTIFICATION

I certify under penalty of law that I have examined and am familiar with the information in the enclosed documents, including all attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are, to the best of my knowledge and belief, true and complete. I am aware that there are significant penalties for knowingly submitting false statements and information, including the possibility of fines or imprisonment pursuant to Section 1(c)(2) of the Clean Air Act and 18 U.S.C. §§ 1001 and 1341.

Respectfully submitted,

John R. Bedeck
Project Manager & Dir. of Quality
S.H. Bell Company

Prepared by:
Consolidated Analytical Systems, Inc.

Figure 1
Site Location and Vicinity Map
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

Figure 2
Proposed and Existing Monitoring Locations
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

Site ID	Latitude	Longitude
PS1	41.708264	-87.544006
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Attachment 1
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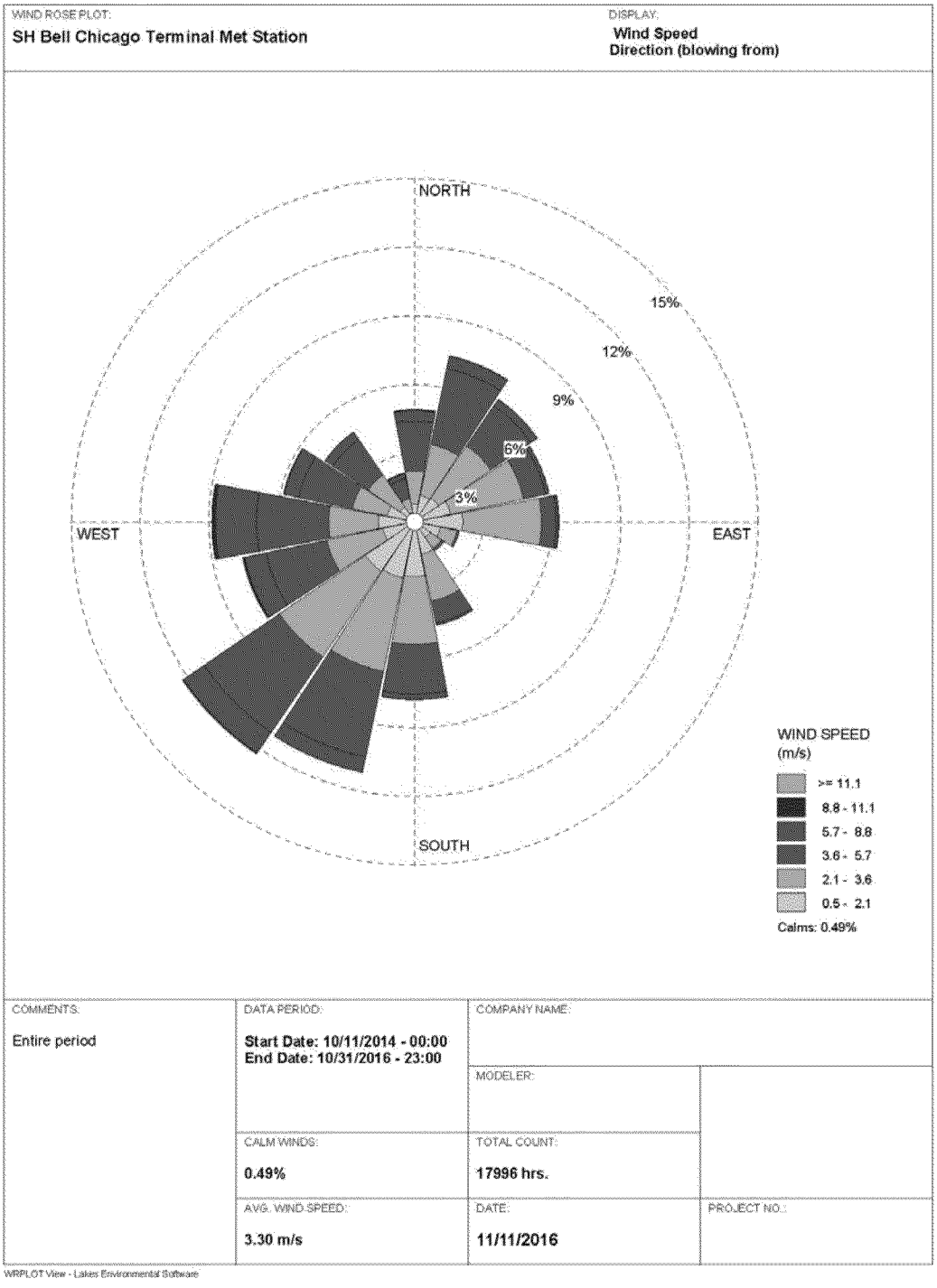
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617



SH BELL CO
HANDLING WITH CARE • LME APPROVED

January 30, 2017

United States Environmental Protection Agency, Region 5
Air and Radiation Division
Attn: Nicole Cantello (Cantello.nicole@epa.gov), George T. Czerniak, and R5enforcement@epa.gov
77 W. Jackson Blvd
Chicago, IL 60604

RE: **S.H. Bell Company**
10218 South Avenue O
Chicago, Illinois 60617
Response to January 12, 2017 Email Request to Provide Justification for Monitor Site Selection

Dear Ms. Cantello:

Per the conference call between USEPA Region 5 Air and Radiation Division and S.H. Bell on January 25, 2017, S.H. Bell and our contractors have completed an evaluation of the attributes of current Proposed Monitoring Site 2 (PS2) and three additional areas on the S.H. Bell property. Our evaluation is detailed below. Consideration was given to determine if a suitable monitoring site could be installed or developed at each of these sites consistent with USEPA siting criteria guidelines outlined in 40CFRPart 58, Appendix E. Alternative locations are named as follows, see attached Figure 1 for locations of the monitoring sites on the S.H. Bell property and Figures 2-5 for site layouts of each of the proposed sites :

1. PS2 is S.H. Bell's original proposed location for PS2
2. PS2.1 is the S.H. Bell site office
3. PS2.2 is an area north of the S.H. Bell high bay
4. PS2.3 is a bulk material storage area located approximately 100 feet west of the S.H. Bell site office. This site was not proposed as a monitoring location by Region 5, but was considered during our original evaluation of proposed site monitoring locations.

PS2.1 (Office Location/Figure 2):

The office location consists of an office trailer, associated gravel parking lot and wooded area. A gravel parking area is located adjacent to the west of the building. The parking area is bound to the west by a vegetated earthen berm. A densely wooded area is located adjacent to the south of the building. The property boundary is located just east of the office building. A gated entrance and road deck are adjacent to the north of the office building.

In order to meet the USEPA siting requirements for spacing from an obstruction and distance from a road surface, the only potential monitoring location at this site would be to the south of the office building, in the wooded area. S.H. Bell deemed this location unacceptable for several reasons:

1. Clearing of the site and the trees would be difficult due to the size of the trees as well as the location of the trees with respect to the road surface (S Ave N), which is located outside of the S.H. Bell property boundary. Additionally, the time required to complete the tree removal process would likely impact the operational date.
2. Based on the prevailing wind direction from the southwest, air to the inlet at this site would have to travel over the vegetated berm located west of the trees and office causing uplift of particulate matter, potentially severe enough to travel over the intake of the continuous particulate analyzer.
3. A brick structure is located offsite south of the trees that would restrict airflow from the primary wind direction.
4. The existing trees act as a vegetative barrier for particle matter exiting the property onto the surrounding receptors.

PS2.2 (North of High Bay/Figure 3)

The high bay is an approximately 40 foot high structure with associated parking and a road deck directly to the south, a road deck to the west, the property boundary to the east, trees directly to the north (on and off S.H. Bell property), and a narrow triangular mixed-use storage and parking area to the north.

S.H. Bell could not identify a location that meet the siting requirement for spacing from an obstruction and distance from a road surface. When evaluating this area, several key issues were considered, including:

1. The minimum site location distance from the building is approximately 68' (assuming 2 meter inlet height), assuming no additional obstructions
2. An offsite tree row parallel to S Ave N, runs north from the high bay to the facility entrance located near E 101st St. Tree heights in this area range 15 to 25 feet.
3. The exiting road deck runs from the Northwest corner of the high bay to the Northeast. Minimum site location would need to be 2 meters from this road surface.
4. An onsite berm parallel to S Ave N, runs north from the high bay to the facility entrance located near E 101st St.

PS2.3 (Bulk Material Storage Area/Figure 4):

The Bulk Material Storage Area location is a material storage area with a road deck directly to the west, a vegetated berm to the east, the S.H. Bell property boundary to the south, and a road deck to the north.

S.H. Bell could not identify a location that meets the siting requirement for spacing from an obstruction and distance from a road surface at this location. When evaluating this area, several key issues were considered, including:

1. The area is regularly used for bulk storage of materials being received, stored, and loaded.
2. The storage piles vary in height, affecting airflow, consistency, and direction
3. No reserved footprint for the siting location is present in the area

PS2 (Initial Proposed PS2/Figure 5):

S.H. Bell maintains the best cardinal point location for a southerly and easterly airflow is represented by the initially proposed PS2.

An additional site evaluation has confirmed this site has several key attributes that exceed minimum siting requirements, including:

1. The road surfaces near the site allow for a minimum clear distance of greater than 2 meters from the road deck located on S.H. Bell property, E 103rd, and S Avenue O.
2. The proposed location is approximately 60' from the nearby building which is approximately 20' high. Assuming a 2 meter inlet height, the site could be located approximately 28' from the building, assuming no additional obstructions.
3. No vegetative (i.e., vegetated berms or trees) or other obstructions are present that are not easily removed. (note: a small vegetative obstruction will be removed along the fence line).

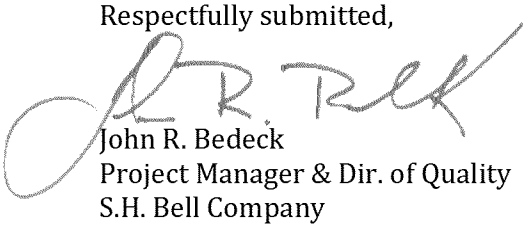
SUMMARY

S.H. Bell looks forward to USEPA's review and approval of responses to questions regarding monitoring site selection. Should you have any additional questions about the evaluation, please let me know.

CERTIFICATION

I certify under penalty of law that I have examined and am familiar with the information in the enclosed documents, including all attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are, to the best of my knowledge and belief, true and complete. I am aware that there are significant penalties for knowingly submitting false statements and information, including the possibility of fines or imprisonment pursuant to Section 1(c)(2) of the Clean Air Act and 18 U.S.C. §§ 1001 and 1341.

Respectfully submitted,



John R. Bedeck
Project Manager & Dir. of Quality
S.H. Bell Company

Prepared by:
Consolidated Analytical Systems, Inc.

Figure 1
Proposed Site PS2 Locations
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

Figure 2
PS2.1 (Office Area) Site Layout
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

SH BELL CO
HANDLING WITH CARE • LME APPROVED

February 6, 2017

United States Environmental Protection Agency, Region 5
Air and Radiation Division
Attn: Nicole Cantello (Cantello.nicole@epa.gov), George T. Czerniak, and R5enforcement@epa.gov
77 W. Jackson Blvd
Chicago, IL 60604

RE: **S.H. Bell Company**
10218 South Avenue O
Chicago, Illinois 60617
Response to January 12, 2017 Email Request to Provide Justification for Monitor Site Selection

Dear Ms. Cantello:

Per the direction of USEPA Region 5 during the conference call held February 2, 2017 between USEPA Region 5 Air and Radiation Division; The City of Chicago; S.H. Bell; S.H. Bell's counsel, Eckert Seamans Cherin & Mellott, LLC; and S.H. Bell's contractor, Consolidated Analytical Systems, Inc., S.H. Bell and its contractor have completed a re-evaluation of the attributes of alternative Proposed Monitoring Site 2.2 (PS2.2). This re-evaluation was completed because USEPA Region 5 stated that the initially proposed PS2 location was unacceptable to meet its objectives for this monitoring program. Key points from our re-evaluation are detailed below. Consideration was again given to determine if a suitable monitoring site could be installed or developed at PS2.2 that would be consistent with USEPA siting criteria guidelines outlined in 40CFRPart 58, Appendix E.

S.H. Bell maintains the best cardinal point location for a southerly and easterly airflow is represented by the initially proposed PS2. However, at the direction of USEPA Region 5 Air and Radiation Division S.H. Bell will move site location PS2 to USEPA Region 5's preferred alternative location of PS2.2 even though some deviations from USEPA siting guidance outlined in 40CFRPart 58, Appendix E will be required. Deviations are listed below in section PS2.2.

Please note, locations PS1, PS3, and PS4 have been determined to be acceptable monitoring site locations by USEPA Region 5 and only the location of PS2 is being re-evaluated. See attached Figure 1 for locations of the proposed monitoring sites on the S.H. Bell property and Figures 2-4 for photographs of site attributes at PS 2.2. Alternative locations are named as follows,

1. PS2 is S.H. Bell's original proposed location for PS2
2. PS2.2 is an area north of the S.H. Bell high bay

PS2.2 (North of High Bay/Figure 2)

The high bay is an approximately 40 foot high structure with associated parking and a road deck directly to the south, a road deck to the west, the property boundary to the east, trees directly to the

north (on and off S.H. Bell property), and a narrow triangular mixed-use storage and parking area to the north.

S.H. Bell could not identify a location that meets the complete siting requirements for spacing from an obstruction when evaluating this area and it is our understanding that USEPA will grant an exception to place the FEM instrumentation at this location – see Figure 3 for site features. In an email dated February 2, 2017 from Nicole Cantello at USEPA Region 5 to Eckert Seamens, USEPA Region 5 provided reference to 40CFR Part 58, Appendix E, Section 4 (Spacing from Obstructions) and highlighted the excerpt stating: "An exception to this requirement can be made for measurements taken in street canyons or at source-oriented sites where buildings and other structures are unavoidable." When placing a monitor at this location, the high bay will be considered an "unavoidable structure." When evaluating this area, several key issues were considered, including:

1. The minimum site location distance from the building is approximately 68' (assuming 2 meter inlet height), assuming no additional obstructions. S.H. Bell will place the monitor as far as physically possible from the high bay. However, based on other site constraints in this area (detailed below), it may not be possible to place the monitor the full 68' away.
2. A row of trees bounds the S.H. Bell property to the east. The row of trees is located off of the S.H. Bell property and runs north -south, parallel to S. Ave N, extending from the high bay north to the facility entrance located near E 101st St. Tree heights in this area range 15 to 25 feet.
3. The exiting road deck runs from the Northwest corner of the high bay to the Northeast (see Figure 2). The road is heavily used during business hours, and diesel trucks idle on the nearby scales. Minimum site location would need to be 2 meters from this road surface. S.H. Bell will place the monitor as far away as possible from the road deck and truck scales in order to avoid potential influence of particulate matter from the roadway and trucks.
4. Several large (approximately 60 foot high) trees are located adjacent to the north of the high bay building (Figure 4). These trees will need to be removed in order to site the monitor at PS2.2 without interference from the trees.

Additional Considerations

Following installation and start-up of the monitors, if it is determined that the concentrations at location PS2.2 are not representative of site conditions due to the influence of airflow around the high bay (based on data collected from the other three monitoring sites) S.H. Bell reserves the right to move location PS2.2 to a more representative monitoring location area along the eastern border of the S.H. Bell property.

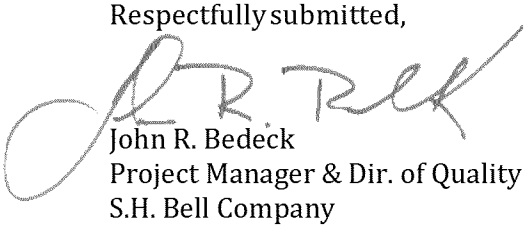
SUMMARY

S.H. Bell looks forward to USEPA's review and approval of responses to questions regarding monitoring site selection. Should you have any additional questions about the evaluation, please let me know.

CERTIFICATION

I certify under penalty of law that I have examined and am familiar with the information in the enclosed documents, including all attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are, to the best of my knowledge and belief, true and complete. I am aware that there are significant penalties for knowingly submitting false statements and information, including the possibility of fines or imprisonment pursuant to Section 1(c)(2) of the Clean Air Act and 18 U.S.C. §§ 1001 and 1341.

Respectfully submitted,



John R. Bedeck
Project Manager & Dir. of Quality
S.H. Bell Company

Prepared by:
Consolidated Analytical Systems, Inc.

Figure 1
Proposed Monitoring Site Locations
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

Figure 2
Aerial View of Proposed Site PS2.2 (High Bay) Monitoring Location
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

Figure 3
PS2.2 (High Bay) Site Layout
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

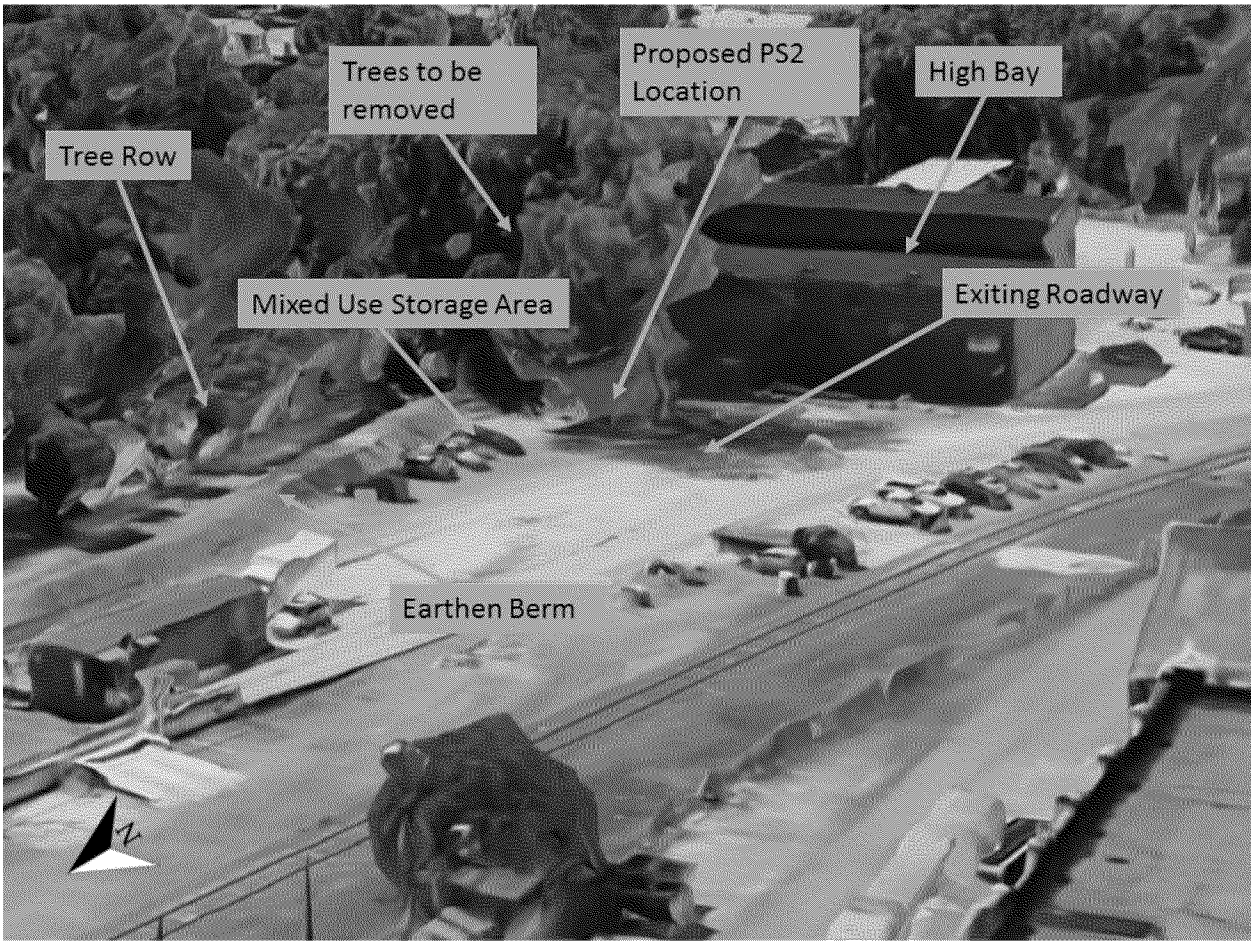
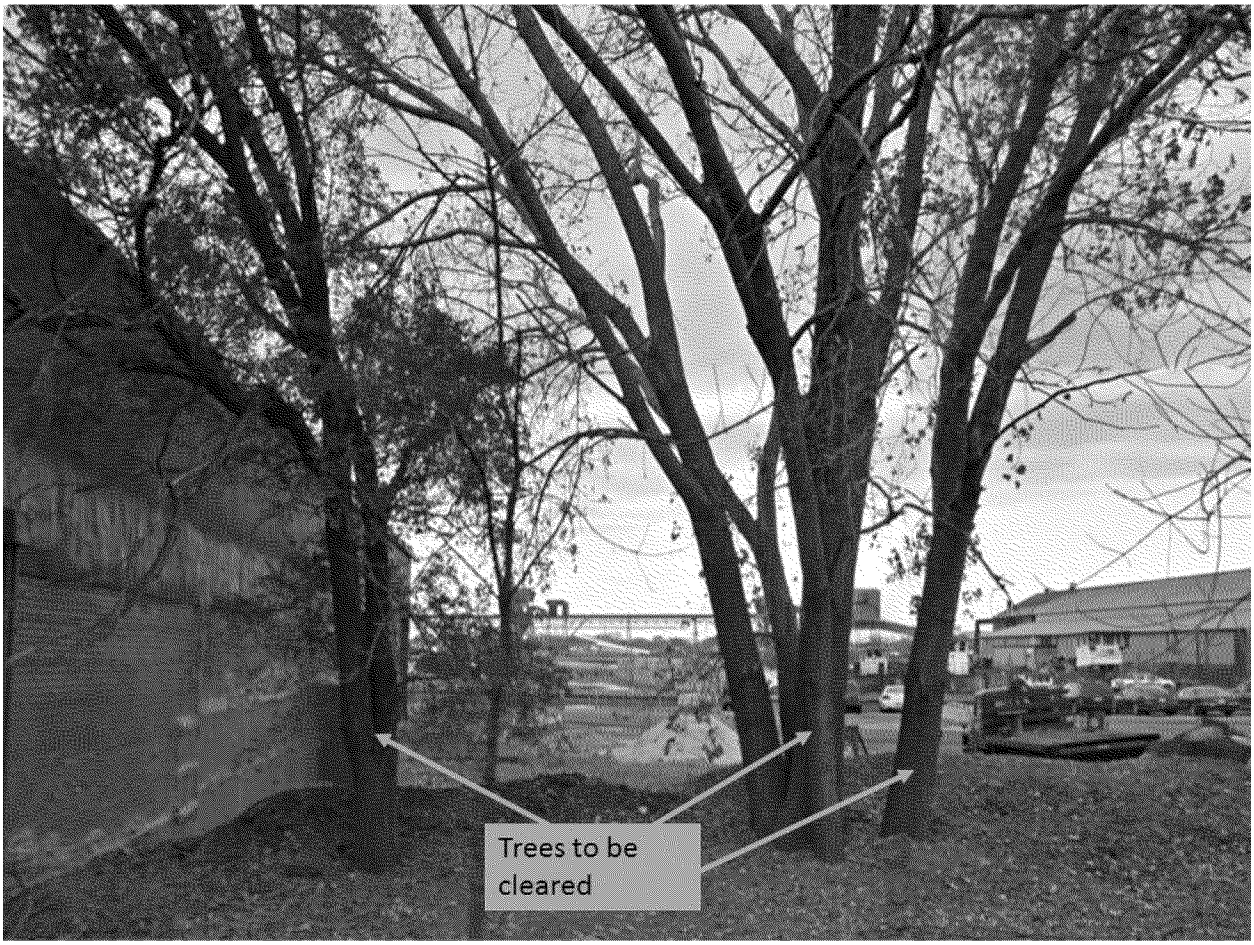


Figure 4
View to West of PS2.2 from S. Ave N on eastern property boundary.
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617



Note: High Bay building is visible on the left side of the frame

Figure 3
PS2.2 (North of High Bay) Site Layout
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

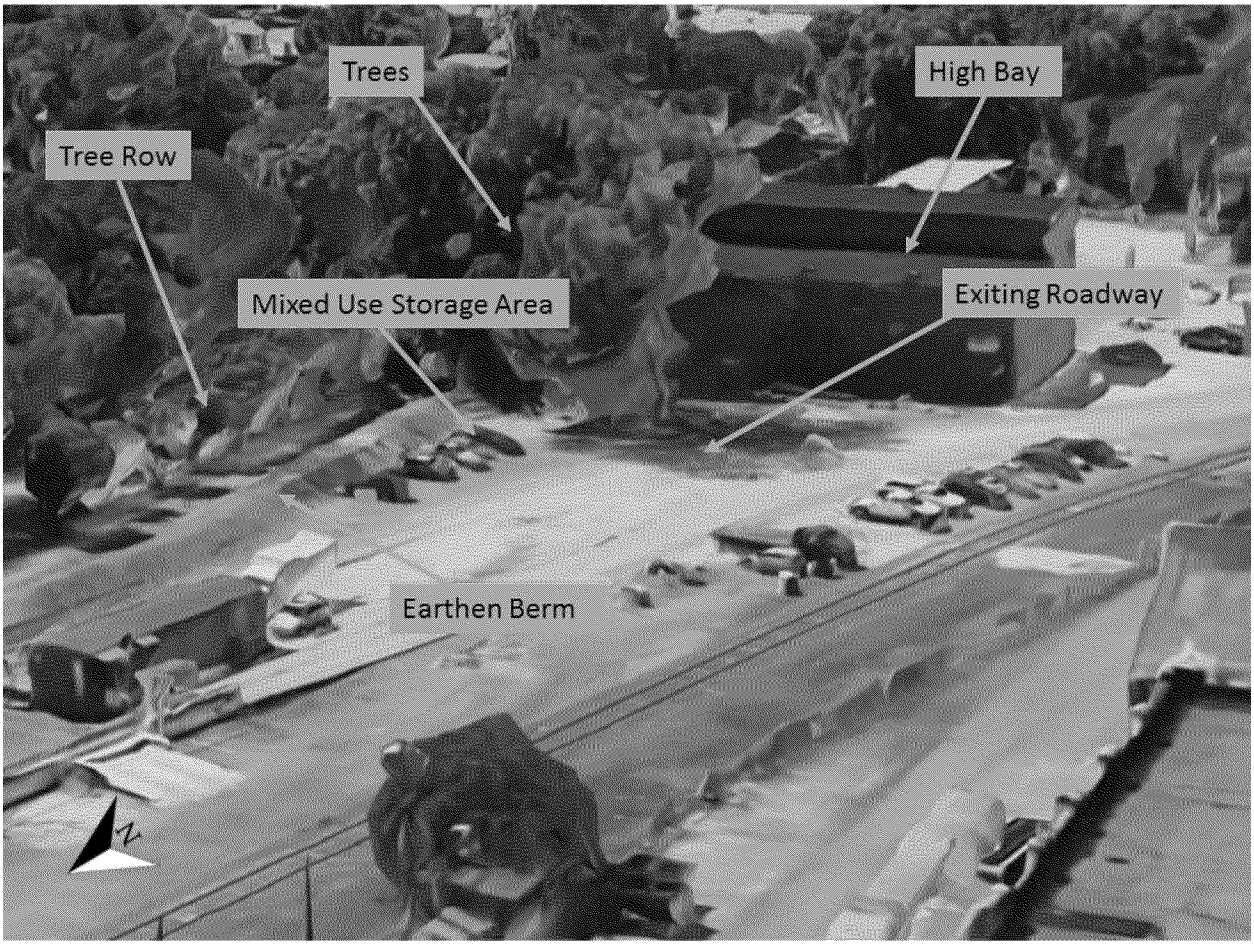


Figure 4
PS2.3 (Bulk Material Storage Area) Site Layout
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

Figure 5
PS2 (Initial Proposed PS2) Site Layout
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

SH BELL CO
HANDLING WITH CARE • LME APPROVED

February 10, 2017

United States Environmental Protection Agency, Region 5
Air and Radiation Division
Attn: Nicole Cantello (Cantello.nicole@epa.gov), George T. Czerniak, and R5enforcement@epa.gov
77 W. Jackson Blvd
Chicago, IL 60604

RE: **S.H. Bell Company**
10218 South Avenue O
Chicago, Illinois 60617
Response to February 7, 2017 Email Request to Relocate Proposed Monitoring Site PS2.2

Dear Ms. Cantello:

This letter is a response to USEPA Region 5's February 7, 2017 email request to relocate proposed monitoring site PS2.2.

Monitor Location

During the February 2, 2017 conference call between USEPA Region 5, the City of Chicago, and S.H. Bell and its counsel and contractor (Eckert Seamans Cherin & Mellot and CAS, respectively) to discuss the additional proposed PS2 monitoring locations PS2.1, PS2.2, and PS2.3, the following items were discussed in open conversation:

- PS2.1 and PS2.3 were deemed to be unsuitable monitoring locations.
- PS2.2 was determined to be the most suitable monitoring location, even though all USEPA siting criteria conditions (as outlined in 40 CFR Part 58 Appendix E) could not be met. Rationale for seeking exemptions to USEPA siting criteria was reviewed by all parties on the call. USEPA agreed to provide S.H. Bell with additional guidance on exemptions to siting criteria to use as rationale for placing the monitor at PS2.2.
- Parties discussed placement of the monitor within the general area of the proposed PS2.2 area.
    - Specifically, the area in the northern portion of the PS2.2 alternative location adjacent to the road deck and weigh station was discussed. After discussion (notably between Mr. Seth Cloran of CAS and Mr. Patrick Miller of USEPA Region 5), this area was determined to be unsuitable due to its proximity to the road deck and weigh station where bulk material haulers (primarily diesel-fuel vehicles) idle.

However, in its February 7, 2017 e-mail correspondence, USEPA Region 5 recommended placement of the monitor within a blue-shaded area in the northern portion of the PS2.2 alternative location adjacent to the road deck and weigh station.

S.H. Bell is seeking clarification regarding USEPA Region 5's intended monitor location. A summary of the rationale for locating PS2.2 in the orange outlined area rather than the blue outlined area identified in USEPA Region 5's email is presented below (see Figure 1 for reference). The western portion of the blue-shaded area would be located close to a road deck and weigh station where bulk material haulers (primarily diesel-fueled vehicles) idle at the approach to the scale house. Having a monitor this close has the potential to influence the monitor as a point source measurement, which would:

- Not be representative of the PM10 concentrations that nearby receptors would be potentially exposed to, and
- Not be representative of the S.H Bell PM10 contribution to the ambient air mass.
- Additionally, the blue-shaded area identified by USEPA Region 5 in its February 7, 2017 email is currently used as a parking lot for S.H Bell employees and contractors, and thus, placing the monitor in this location will negatively impact operations of the facility, which makes this area unsuitable as a monitor location.

Further, the eastern portion of the blue-shaded area recommended by USEPA Region 5 is located next to a vegetated berm and tree row (located off S.H. Bell property). These obstacles could potentially generate an inlet aspiration area which could result in PM concentrations which are not representative of the actual S.H Bell contribution to the particulate in the ambient air mass.

In summary, compounding the deviations from USEPA siting criteria will increase the negative impacts of the efficacy of the data produced from the monitoring locations.

Monitor Platform

During the February 2, 2017 conference call, no mention of placing the monitor on an elevated platform was made. However, in its February 7, 2017 email USEPA Region 5 recommended placing the monitor on a platform. In regards to the request for a "monitor raised on a platform", S.H. Bell contends:

- Placing one (PS2.2) of the four Particulate monitor inlets on a platform with a higher distance from ground level, while the other three approved monitoring locations (PS1, PS3, PS4) are aspirating air at the same relative height from ground level is not advised. S.H Bell has selected our monitoring locations to provide uniformity across our facility; the placement of one of the particulate monitors on a significantly elevated platform has the potential to negatively influence the uniformity of data being collected by the monitor to determine the source/site contribution to the ambient air mass.

S.H. BELL RECOMMENDATION:

In order to collect the most representative and scientifically defensible data at the S.H. Bell facility, S.H. Bell proposes the particulate monitor at site PS2.2 be placed at an approximate location between 20' and 40' from the northern wall of the High Bay, at a location between 40' and 50' from the centerline of the tree row running north/south on the S.H Bell property side (west) of S Ave N. To provide uniformity of monitoring stations across the S.H. Bell facility, the monitor at PS2.2 should be placed at the same height from ground level as other monitors at the site.

SUMMARY

S.H. Bell looks forward to USEPA Region 5's clarification on this matter and to beginning monitoring.

INCORPORATION BY REFERENCE

Documentation of discussions held to date regarding monitoring site locations at the S.H. Bell facility are documented below. Previous communications are incorporated by reference.

By way of background, this is USEPA Region 5's fourth request to re-evaluate/re-locate the initially proposed PS2 monitoring site location, which were previously made in a January 12, 2017 e-mail from Nicole Cantello and in conference calls on January 25, 2017 and on February 2, 2017. S.H. Bell has promptly responded to all of USEPA Region 5's requests in this regard. Notably, S.H. Bell's February 6, 2017 letter re-evaluated the alternative site location PS2.2 when USEPA stated that the initially proposed PS2 monitoring location was unacceptable as it did not meet its objective for this monitoring program. The initially proposed PS2 monitoring location is the only location that meets all USEPA siting criteria. At the direction of USEPA Region 5 during a February 2, 2017 conference call, S.H. Bell evaluated moving the monitor site location PS2 to USEPA Region 5's preferred alternative location of PS2.2 even though multiple deviations from USEPA siting criteria will be required. Notably, the PS2.2 alternative location was specified to USEPA in a letter dated January 30, 2017 that was in response to USEPA's request to evaluate alternative locations on the eastern site of the facility.

CERTIFICATION

> I certify under penalty of law that I have examined and am familiar with the information in the enclosed documents, including all attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are, to the best of my knowledge and belief, true and complete. I am aware that there are significant penalties for knowingly submitting false statements and information, including the possibility of fines or imprisonment pursuant to Section 1(c)(2) of the Clean Air Act and 18 U.S.C. §§ 1001 and 1341.

Respectfully submitted,

John R. Bedeck
Project Manager & Dir. Of Quality
S.H. Bell Company

Prepared by:
Consolidated Analytical Systems, Inc.

Figure 1
Proposed Monitoring Site Location
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

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HANDLING WITH CARE • LME APPROVED

February 14, 2017

United States Environmental Protection Agency, Region 5
Air and Radiation Division
Attn: Nicole Contello (Cantello.nicole@epa.gov), George T. Czerniak, and R5enforcement@epa.gov
77 W. Jackson Blvd
Chicago, IL 60604

RE: **S.H. Bell Company**
10218 South Avenue O
Chicago, Illinois 60617
Letter Update to S.H. Bell's December 30, 2016 Response to:
Request to Provide Information Pursuant to the Clean Air Act
Appendix B, PM_{10} Monitors and Siting
Proposed Monitoring Sites and Locations

Dear Ms. Cantello:

S.H. Bell is pleased to submit this update to our December 30, 2016, response to USEPA Region 5 Air and Radiation Division's Request to Provide Information Pursuant to the Clean Air Act dated March 9, 2015. Specifically, this letter report documents the location change for proposed monitoring location PS2 determined during a series of telephone discussions, emails, and letter reports between USEPA Region 5, the City of Chicago, S.H. Bell, S.H. Bell's counsel Eckert, Seamans, Cherin & Mellott, LLC, and S.H. Bell's air monitoring contractor Consolidated Analytical Systems, Inc., as documented below. The final proposed monitoring locations PS1, PS2, PS3, and PS4 are shown on Figure 1.

INCORPORATION BY REFERENCE

- *12/30/2016 – S.H. Bell "Response to Request to Provide Information Pursuant to the Clean Air Act, Appendix B, PM10 Monitors and Siting, Proposed Monitoring Sites and Locations"*
- *01/11/2017 – USEPA Region 5 Email from Nicole Cantello "S.H. Bell Company Chicago, S. Avenue O Terminal – Monitoring and Siting" (request for clarification to proposed monitoring site selection)*
- *01/18/2017 – S.H. Bell Letter "Response to January 12, 2017 (sic) Email Request to Provide Justification for Monitor Site Selection"*
- *01/25/2017 – Conference Call between USEPA Region 5 and S.H. Bell (request for evaluation of PS2, PS2.1, PS2.2, and PS2.3)*
- *01/30/2017 – S.H. Bell S. Letter Response to January 12, 2017 (sic) Email Request to Provide Justification for Monitor Site Selection (Response to 01/25/2017 conference call requesting written evaluation of PS2, PS2.1, PS2.2, PS2.3)*
- *02/02/2017 – Conference Call between USEPA Region 5, the City of Chicago, S.H. Bell, Eckert Seamans Cherin & Mellot, LLC and Consolidated Analytical Systems, Inc. (request to re-evaluated alternative proposed monitoring site PS2.2)*

- *02/06/2017 – S.H. Bell Letter "Response to January 12, 2017 (sic) Email Request to Provide Justification for Monitor Site Selection" (Re-Evaluation of alternative proposed site PS2.2)*
- *02/07/2017 - USEPA Region 5 Email from Nicole Cantello "S.H. Bell Company Chicago, S. Avenue O Terminal – Monitoring and Siting" (request to locate proposed monitoring site PS2.2)*
- *02/10/20117 – S.H. Bell Letter "Response to February 7, 2017 Email Request to Locate Proposed Monitoring Site PS2.2"*
- *02/13/2017 – USEPA Region 5 Email from Nicole Cantello "S.H. Bell Company Chicago, S. Avenue O Terminal – Monitoring and Siting" (request to resubmit S.H. Bell siting plan for approval)*

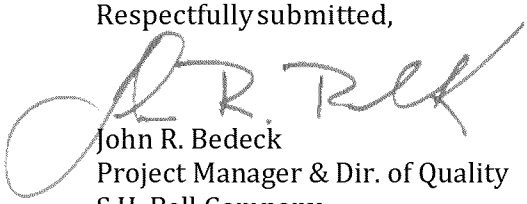
SUMMARY

S.H. Bell looks forward to installing, operating, and maintaining ambient monitoring sites at the facility upon your approval of the proposed plan. Should you have any questions about the proposed monitoring locations, please let me know.

CERTIFICATION

I certify under penalty of law that I have examined and am familiar with the information in the enclosed documents, including all attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are, to the best of my knowledge and belief, true and complete. I am aware that there are significant penalties for knowingly submitting false statements and information, including the possibility of fines or imprisonment pursuant to Section 1(c)(2) of the Clean Air Act and 18 U.S.C. §§ 1001 and 1341.

Respectfully submitted,



John R. Bedeck
Project Manager & Dir. of Quality
S.H. Bell Company

Figure 1
Proposed and Existing Monitoring Locations
S.H. Bell Facility, 10218 South Avenue O, Chicago, Illinois 60617

Site ID	Latitude	Longitude
PS1	41.708264	-87.544006
PS2	41.710537	-87.539158
PS3	41.710494	-87.542090
PS4	41.711527	-87.539628
EMS	41.709861	-87.539692